DICTYOCERATIDA, DENDROCERATIDA AND VERONGIDA FROM THE NEW CALEDONIA LAGOON (PORIFERA : DEMOSPONGIAE)

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Twenty nine species of sponges belonging to the orders Dictyoceratida, Dendroceratida and Verongida are described from the lagoon, and fringing and adjacent reefs of New Caledonia. Of these, eighteen are Dictyoceratida and ten are new species, five are Dendroceratida including two new species, and six are Verongida of which five are new. All represent new records for the region. The fauna cannot be compared with those of Indo-West Pacific, Micronesia and Tropical Australia because of the lack of detailed study and good descriptions in all cases, and because many new genera remain to be described from all regions. Generic and familial diagnoses are included for all species recorded. □ *Dictyoceratida, Dendroceratida, Verongida, New Caledonia, shallow-water sponges, lagoon, new genera, new species.*

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Prior to the work of Hooper & Lévi (1993a, 1993b), only about 170 species of Porifera had been described from the New Caledonian region. For Demospongiae in this region, the major emphasis has been on the deeper water fauna (Lévi & Lévi 1983a, 1983b, 1988, Lévi 1991) and the only record of a sponge belonging to the Dictyoceratida, Dendroceratida or the Verongida, is that of *Ircinia aligera* (Burton) by Lévi and Lévi (1983b). No authors dealing with shallow water faunas have recorded any species from the same three orders. Lévi (1979), in a review of the demosponge fauna of the New Caledonian area, referred to the occurrence of "extensive populations of massive species of *Spongia, Dysidea, Ircinia, Fasciospongia*" and stated that all genera of Dendroceratida were present as was "massive *Psammaplysilla*" (Verongida). These comments are in large measure accurate, but thus far no taxomonic descriptions of this fauna have reached the literature. This deficit for shallow water and reef fauna of the New Caledonian region applied in many sponge groups, but it was most extreme for the three orders considered in this paper.

Based on the excellent sponge collections amassed by ORSTOM over many years, a collaborative project involving New Zealand, French, and Australian sponge systematists was launched. The aim, following a series of workshops and some field work, was to produce a taxonomic inventory of the shallow water fauna and a lay field guide to the major species. It is recognised, however, that many additional species remain to be described. For the Dictyoceratida, Dendroceratida and Verongida many species in the ORSTOM collections were represented by single specimens, and in large genera, particularly *Spongia, Dysidea* and *Ircinia*, this is inadequate for diagnosis and description of new species.

This work records dominant species which were represented by several specimens, and species where confident identification could be made on the basis of individual specimens. Full descriptions of previously described species are included only where earlier literature is deficient. Colour illustrations envisaged for the field guide will add greatly to the figures included in this manuscript.

METHODS

Methods used to prepare and examine sponges for light microscopy are standard. These, and the characters used in description of sponges belonging to the orders Dictyoceratida, Dendroceratida and Verongida, have been detailed elsewhere (Bergquist 1980). Investigation of terpene composition followed procedures outlined in Bergquist et al. (1990a,b). All skeletal and histological descriptions are based on quoted voucher samples; information on species distribution, ecology, live characteristics are based on personal communication with ORSTOM divers, perusal of their photographic archives, and on discussion with colleagues at the ORSTOM workshops. All colour notations relate to Munsell (1942). Diag-

noses of orders are as given by Bergquist (1980), diagnoses of families and genera, some of which are revised, are given in all cases. Abbreviations used in the text are - AUZ, University of Auckland, Zoology; BMNH, The Natural History Museum, London; ORSTOM, Institute Française de Recherche Scientifique pour le Developpement en Co-operation, Centre de Noumea; QM, Queensland Museum, Brisbane.

SYSTEMATICS

Order DICTYOCERATIDA Minchin
Family SPONGIIDAE Gray, 1867

DIAGNOSTIC REMARKS

Dictyoceratida in which the spongin fibres making up the anastomosing skeletal network are homogeneous in cross-section, showing no tendency to fracture around planes of concentric lamination. Fibres contain no pith, but frequently incorporate sandy detritus. There is typically a hierarchy of fibres in terms of orientation and diameter, but primary elements are reduced in some genera. Choanocyte chambers are diplodal, and the matrix is never heavily infiltrated by collagen. The texture of the interior is rough to the touch, reflecting the density of spongin skeleton in relation to soft tissue. The whole body is compressible and resilient except where the surface is heavily sand-encrusted. The skeletal network is never constructed on a precise rectangular pattern. The sponge surface, where not sand-armoured, is always conulose.

Spongia Linne, 1759

Euspongia Bronn, 1859; *Ditela* Schmidt, 1862

TYPE SPECIES

Spongia officinalis Linne, 1759, by subsequent designation (Bowerbank 1862).

DIAGNOSTIC REMARKS

Spongiidae in which the primary fibres are reduced in number and the highly developed secondary network of fine, intertwined fibres makes up the bulk of the skeleton. Primary fibres contain a central axis of foreign material, and are most in evidence near the sponge surface. Secondary fibres contain no foreign material. The texture of the whole is springy and very compressible, supple and elastic. The surface is never heavily armoured, is covered with low, even, conules, and most frequently is pigmented black, brown, or gray; the interior is white to beige. The form of the sponge is variable, but commonly massive spherical, lamellate, or cupshaped.

TYPE SPECIES

Spongia officinalis Linne, 1759, by subsequent designation (Bowerbank 1862).

Spongia australis sp. nov.
(Fig. 1A-C)

MATERIAL EXAMINED

HOLOTYPE: QMG304682 ORSTOM (R1330) Stn. 198, Chenal des cinq milles, 22°30'04S, 166°45'04E; 20m depth, 11 Feb 1982. Coll. G. Bargibant.

DIAGNOSIS

Steel blue-gray *Spongia* with a sand reinforced dermal membrane and a harsh texture.

DESCRIPTION

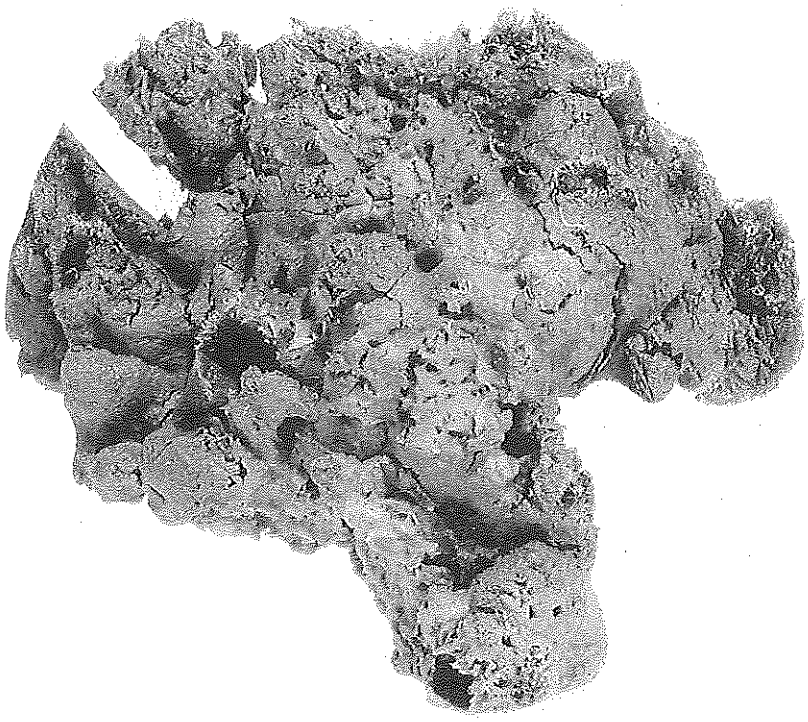
A single specimen of this species was available. The sponge body is thick, spreading, 12 by 16cm wide, 5cm deep with irregularly undulating contours and oscular turrets dispersed randomly. The texture is compressible, springy, but firmer than that of commercial quality species of the genus. The oscules are elevated, 3 - 12mm in diameter, pores are small and scattered. The colour is bluish grey in life (P-B $^{5}/2$), chocolate brown in alcohol (Y-R-Y $^{5}/2$).

Surface. The surface is microconulose to smooth in patches, slightly abrasive to the touch, as a result of a concentration of sand in the dermal membrane. This forms a layer 50-250μm deep but does not form a compact crust.

Skeleton. The skeleton is a dense network predominantly of uncored secondary fibres 5-25μm in diameter. Primary fibres are frequent, cored, 40-70μm in diameter, and most evident in the immediate subsurface region. The secondary network is particularly dense around large exhalant canals.

Soft tissue organisation. The soft tissue is evenly and very lightly infiltrated by collagen, with the ectosomal region differentiated only by the presence of large exhalant canals. Choano-

FIG. 1. A-C, *Spongia australis* sp. nov. A, Holotype QMG304682, preserved specimen (x 0.5). B, Holotype QMG304682, in situ (x 0.75). C, Photomicrograph showing primary and secondary skeleton and the dermal sandy layer (x 100).



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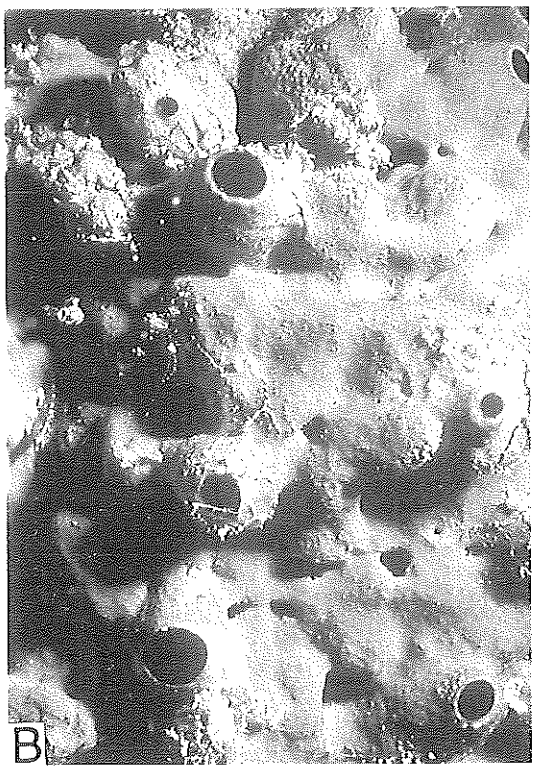

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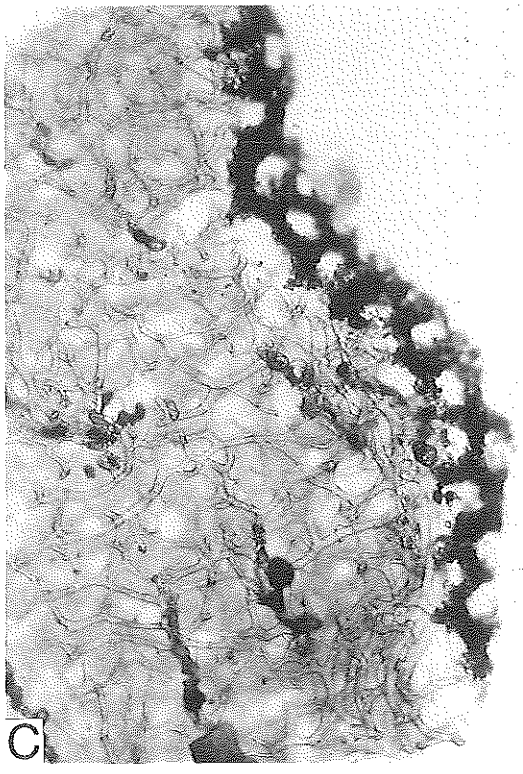

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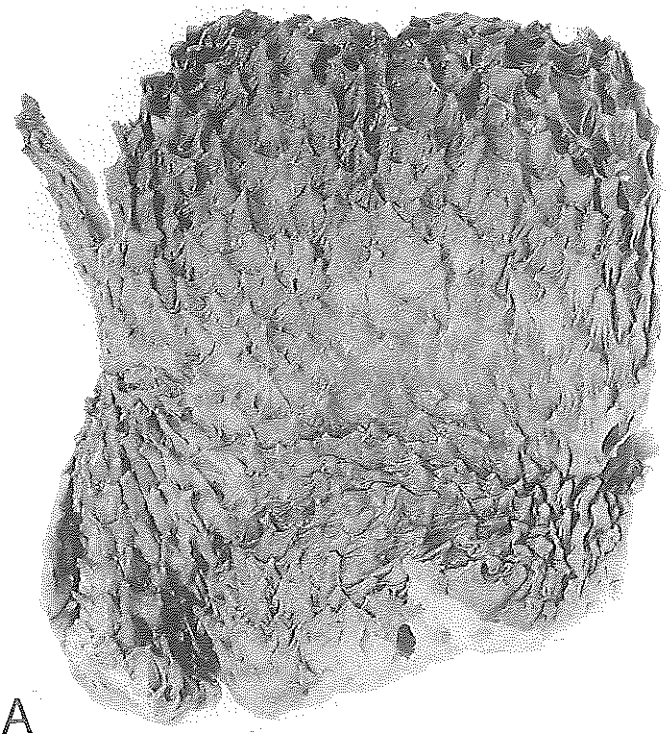

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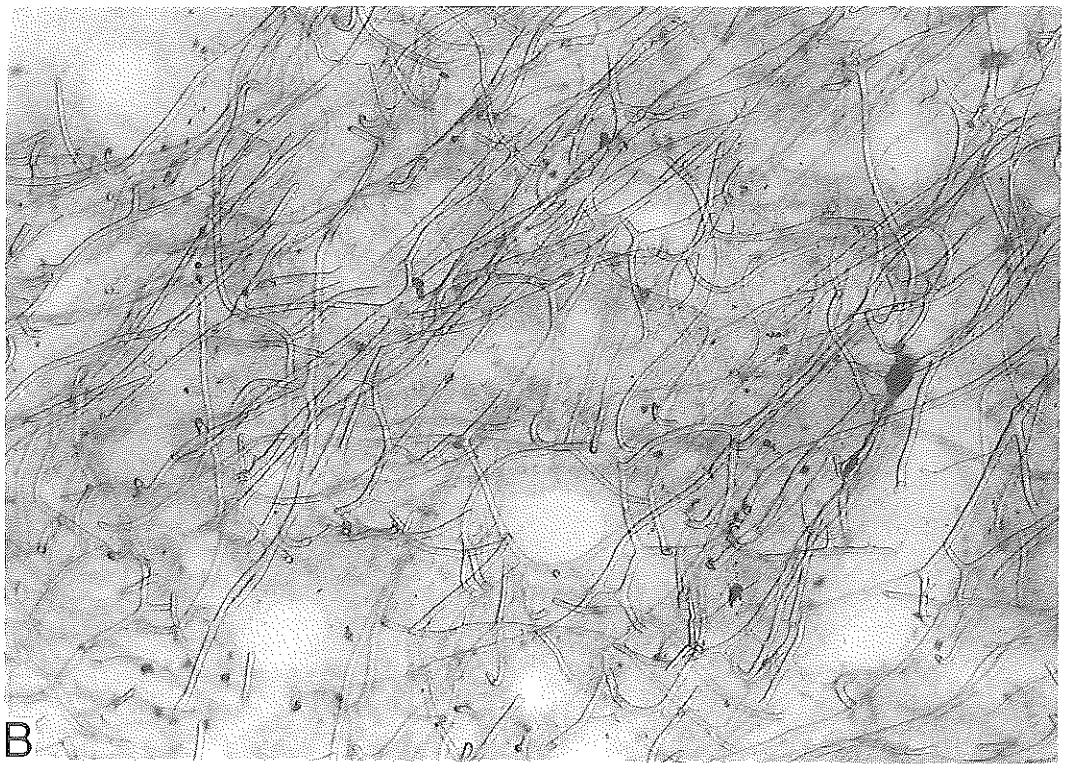

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cyte chambers are circular, and 15-20μm in diameter.

REMARKS

It is difficult to establish a new species within the genus *Spongia* in which there are many names supported by descriptions which will not permit comparison with newly collected specimens. Most descriptions which deal with species from the southern oceans give no information on colour, surface, texture, habitat, or histology. Since the skeletal characteristics in *Spongia* are relatively invariant, one is left only with gross morphology and geographic distribution on which to base any assignment to an older name. Type material, where extant, is rarely more than a dry skeleton. *Spongia australis* can be distinguished from all other well described species by the steel blue gray colour, the presence of a sand reinforced dermal membrane and by the rather harsh texture.

ETYMOLOGY

The species name refers to the southern ocean distribution of the sponge.

DISTRIBUTION

Known only from New Caledonia.

Coscinoderma Carter, 1883

TYPE SPECIES

Spongia pesleonis Lamark, 1814, redescribed as *Coscinoderma pesleonis* by Topsent (1930).

DIAGNOSTIC REMARKS

Spongiidae in which the primary fibres are cored and the secondary elements are clear, extremely fine, numerous, and intertwined. Carter's analogy with 'whorls of wool' was apt. The surface of the sponge is invested with a sand armour, but the texture remains soft, spongy, and extremely compressible. The sponge body is flabellate, pyriform, massive, or pedunculate, with apical or marginal oscules.

Coscinoderma mathewsi (Lendenfeld) 1886
(Fig. 2A, B)

Euspongia mathewsi Lendenfeld, 1886: 520, pl. 36, fig. 6.

Coscinoderma mathewsi Lendenfeld, 1889: 334, pl. 12, fig. 7; pl. 20, figs. 9, 10.

Hippospongia communis subspecies *ammata*, de Laubenfels, 1954: 9, pl. II, fig.6.

MATERIAL EXAMINED

HOLOTYPE: BMNH. 86.8.27.301. Dry specimen, Coll. Ponape.

OTHER MATERIAL: MBI P05-80. Coll. Palau, ORSTOM (R664) Stn. 233, Passe de Yandé, 20°05'00S, 161°26'70E, 32m depth, 1 Sept 1978. Coll. P. Laboute.

DESCRIPTION

A single specimen of this species is represented in the ORSTOM collections. It is a massive, hemispherical sponge, 20cm high, 32cm wide with oscules located laterally and apically along low lamellate extensions of the general surface. The texture is extremely soft and compressible, indicative of spongin fibre of the highest quality. Oscules are flush with the surface, 2-6mm in diameter with smooth dermal membrane surrounding and with a slightly elevated elastic lip. Colour in life grayish black, externally, pale yellow/brown internally ($rY^7/6$), in spirit the same. The habitat was coral rubble on the sandy lagoon bottom.

Surface. The surface is strongly conulose with adjacent elements linked by surface tracts to form an intricate regular reticulum. Individual conules are 1-3mm high with rounded tips. The dermal membrane is tightly adherent to the underlying tissue despite the presence of an organised sand cortex 250-350μm deep.

Skeleton. The skeleton is a network of slightly trellised, thin primary fibres which incorporate coring material, and secondary fibres which are thin, vermiform and intertwining. The latter make up the bulk of the skeleton. Primary fibres are 40-100μm in diameter, secondaries 3-12μm in diameter.

Soft tissue organisation. An ectosomal region, 250-350μm deep, is differentiated; it is marked by collagen tracts running parallel to the surface. These provide support and cohesion to the sand cortex. Deep to this region the choanosome has light, uniform collagen deposition and spherical choanocyte chambers 15-30μm in diameter.

REMARKS

Lendenfeld (1885) established this species for a dry sponge from Ponape which he considered

FIG. 2. A,B, *Coscinoderma mathewsi* (Ledenfeld, 1886). A, preserved specimen (x 0.5). B, photomicrograph showing the thin fibres of the secondary skeleton (x 100).

conspecific with *Coscinoderma lanuginosum* Carter. The original description of *C. mathewsi* (as *Euspongia*) is an amalgamation of Carter's description of *lanuginosum* and description of skeletal organisation and dimensions based on the dry specimen of *C. mathewsi*. By 1889 Lendenfeld had revised his earlier view and recognised the genus *Coscinoderma* within which both *lanuginosum* and *mathewsi* were viewed as valid species. He did not add anything to the description of *C. mathewsi* but figured the holotype. This specimen, on re-examination is massive, cake shaped with prominent oscules scattered on the upper, slightly concave surface.

Examination of the of the holotype skeleton confirms the identity of the New Caledonian specimen with *C. mathewsi*. The only other published record of the sponge is by de Laubenfels (1954) as *Hippospongia communis* sub species *ammata* from Kuop Atoll, Ponape and Truk. The habitat he recorded "on the lagoon bottom on dead coral" is identical to the habitat of the New Caledonian specimen. De Laubenfels' description includes an excellent figure (Pl.II, fig.6) of the very distinctive surface of *C. mathewsi*. Bergquist (1980), having examined only the dry holotype, without access to sections, referred *C. mathewsi* to *Spongia*. That decision is revised here.

Other identifications of this sponge have been made by the present author from collections made in Palau by the Marine Biotechnology Institute from Shizuoka, Japan, and from personal collections in Fiji.

DISTRIBUTION

Caroline Islands, Ponape, Kuop, Truk, Palau, Fiji, New Caledonia.

Leiosella Lendenfeld, 1889

TYPE SPECIES

Leiosella elegans Lendenfeld, 1889, by subsequent designation of de Laubenfels (1936).

DIAGNOSTIC REMARKS

Cup shaped, lobed, flabellate or ramose Spongiidae with a skeletal network in which the secondary elements become very dense. The primary fibres are lightly cored and can become fasciculate either where they condense out of the dense secondary network or just below the surface. Some spicule debris can occur in secondary fibres. At the surface there is a thin sand armour, the texture is always firm.

Leiosella ramosa sp. nov.
(Fig. 3A, B)

MATERIAL EXAMINED

HOLOTYPE: QMG304683 ORSTOM (R1312) Stn. 323, Récif des Français, 19°11'30S, 163°05'13E, 10-60m depth, 23 Aug 1981. Coll. P. Laboute.

DIAGNOSIS

Leiosella having a ramose form, prominent surficial sand crust and a skeletal network predominently of secondary uncored fibres.

DESCRIPTION

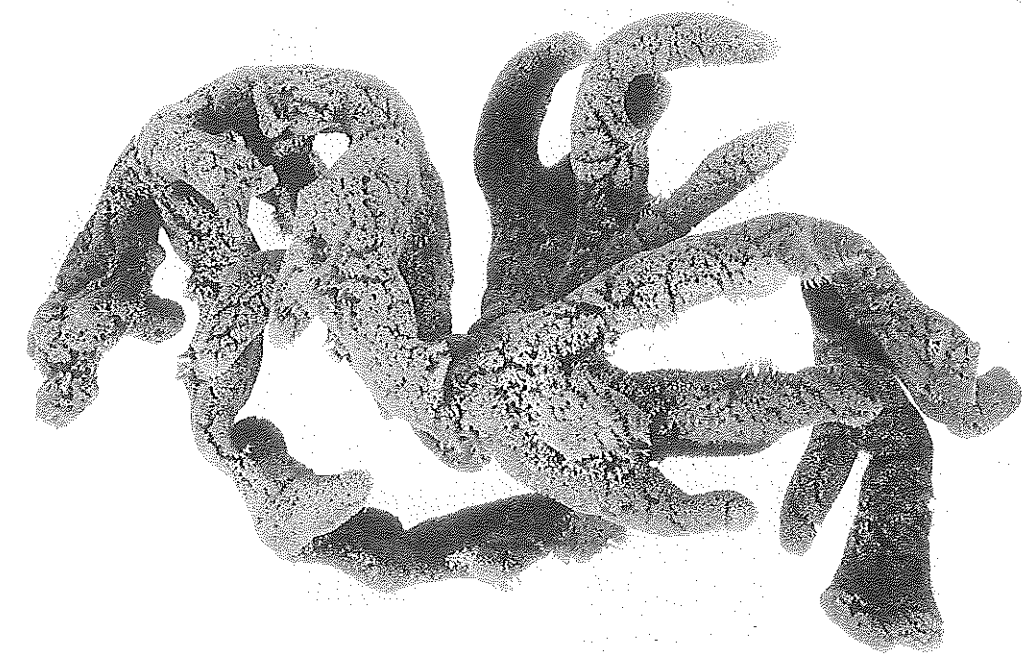
A single specimen was available. It is a ramose sponge branching from a single base of attachment 4cm wide, to a height of 35cm. Stalk and individual branches are elliptical in cross section. The surface is channeled by exhalant canals converging toward the oscules, which are 2-3mm in diameter and located mainly on the sides of branches rather than on the flattened face, and lying flush with the surface. There are areas of the surface in which a white sand crust is evident but this has largely been abraded. Colour in life beige ($rY^8/4$), in spirit brown throughout ($yY\text{-}R^5/6$). The texture is harsh, just compressible.

Surface. In life the surface is smooth, dominated by a very finely reticulated sandy crust, which is developed only in the plane of the surface.

Skeleton. The skeleton is a network predominantly of uncored secondary fibres, 10-40mm in diameter, in a very tight anastomosing pattern. Primary fibres are simple and cored, of uniform diameter, 50-70mm, in the deeper parts of the sponge, but becoming fasciculated where they converge toward the surface. The secondary network is compressed and compacted in the 500µm below the surface.

Soft tissue organisation. The density of the fibre network and the condition of the specimen make observation difficult. Collagen deposition is uniform and light, choanocyte chambers are spherical 15-20µm in diameter.

FIG. 3. A-B, *Leiosella ramosa* sp. nov. Holotype QMG304683, preserved specimen (x 0.25). B, Photomicrograph showing primary and secondary fibre skeleton (x 100).



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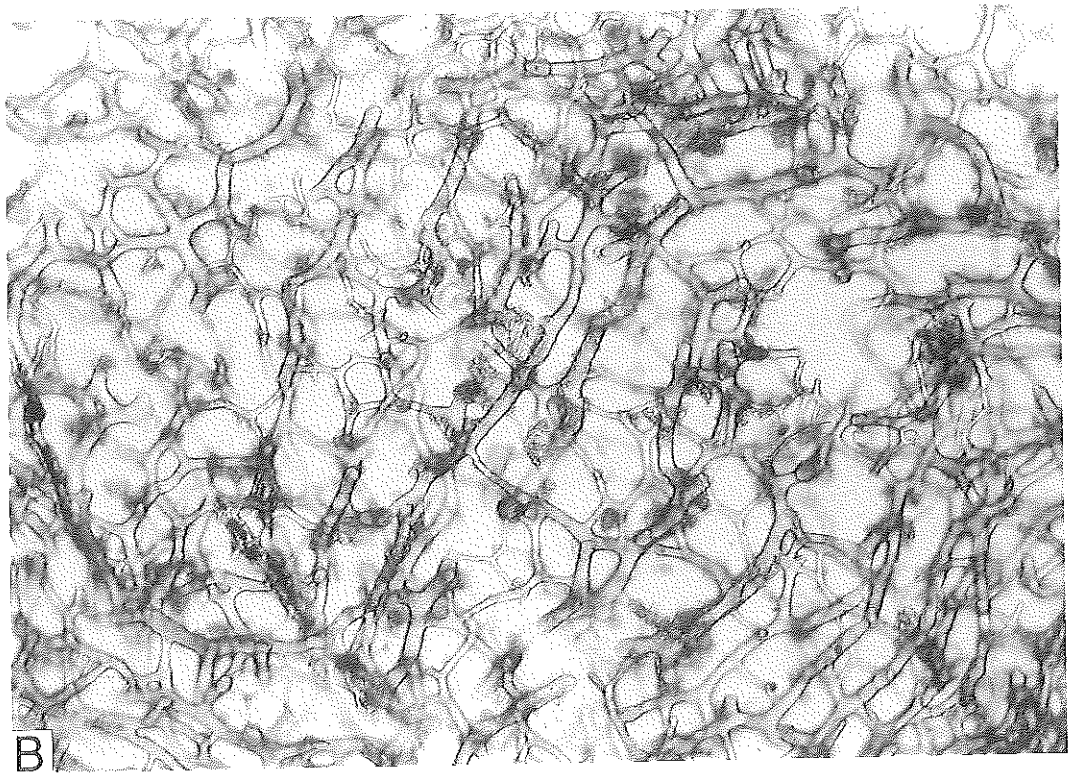

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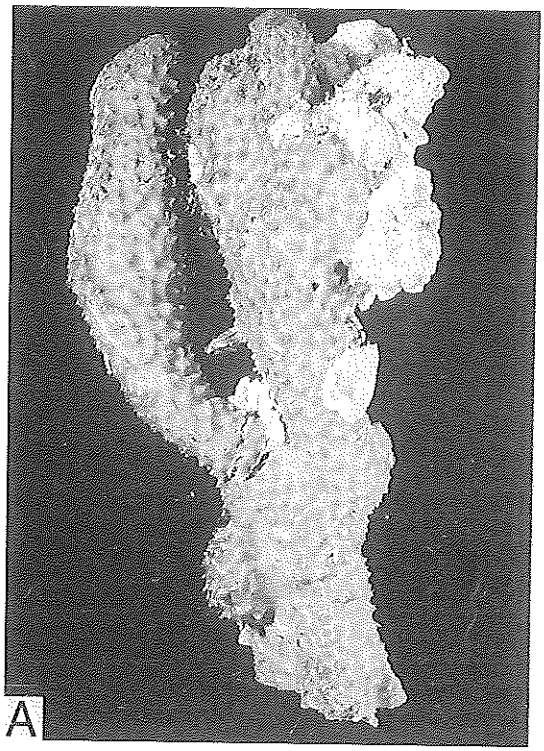
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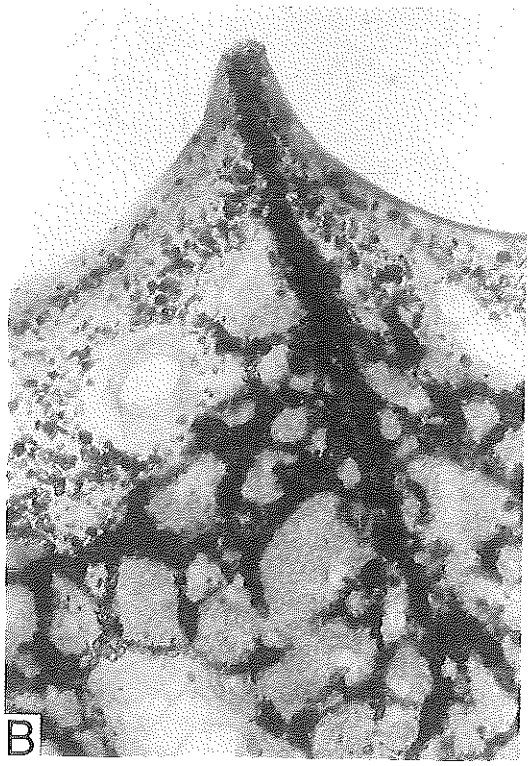
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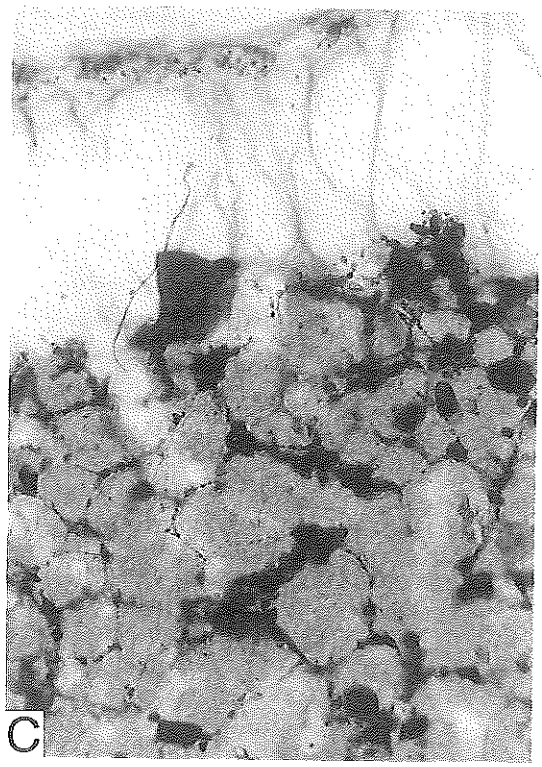
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REMARKS
Characteristics of the surface with its prominent sand crust and the organisation of the skeleton place this species within the genus *Leiosella*. Within the genus the ramose form is unique.

ETYMOLOGY.
The species name reflects the ramose form of the sponge.

DISTRIBUTION
Known only from New Caledonia.

Phyllospongia Ehlers, 1870

Mauricea Carter, 1877.

TYPE SPECIES
Spongia papyracea Esper, 1806, by subsequent designation Burton (1934); Cotype BMNH1931.4.1.1a.

DIAGNOSTIC REMARKS
Lamellate, vasiform, digitate or foliose sponges usually of very thin-walled construction, up to 4.0mm thick except in digitate forms which can be up to 1cm in section. Surface is smooth macroscopically, but irregularly corrugated and regularly conulose microscopically. Oscules are small, flush with the surface, or elevated on low mounds emphasised by sand and collagen deposition around each rim. The skeleton is a rectangular reticulation constituted of primary elements disposed at right angles to the surface and secondary connecting elements aligned parallel to the surface. Primary elements may contain coring material, but this is contained well within the investing spongin and never causes the fibre to become irregular in outline. Secondary elements are never cored and are variable in quantity; their relative dominance is proportional to the thickness of the body construction. The pattern of the primary and secondary skeleton is extremely regular and rectangular in very thin species; in those with slightly thicker habit it becomes less regular as the secondary network expands between the primary columns. Tertiary fibrous elements are also present. They are sometimes dispersed, but predominantly are disposed as an axial skeleton. These vermiform elements are invariably present in basal and stalk regions. In forms with digitate morphology they form marked axial fascicles disposed at right angles to the primary fibres and extending throughout all but the most marginal regions of the body. An organised sand cortex is usually present on one or both surfaces, but it never becomes a pronounced crust as in related genera *Carteriospongia* and *Strepsichordaia*.

Phyllospongia papyracea (Esper) 1806

Spongia papyracea Esper: 1806, 38; *Phyllospongia papyracea* Ehlers, 1870: 22; Bergquist et al., 1988: 304

MATERIAL EXAMINED
COTYPE: BMNH 31.4.1.1a.
ORSTOM (R 1529) Stn. 480, Reef Doiman, 20°35'02S, 165°08' E, 52m depth, 28 Mar 1991. Coll. G. Bargibant.

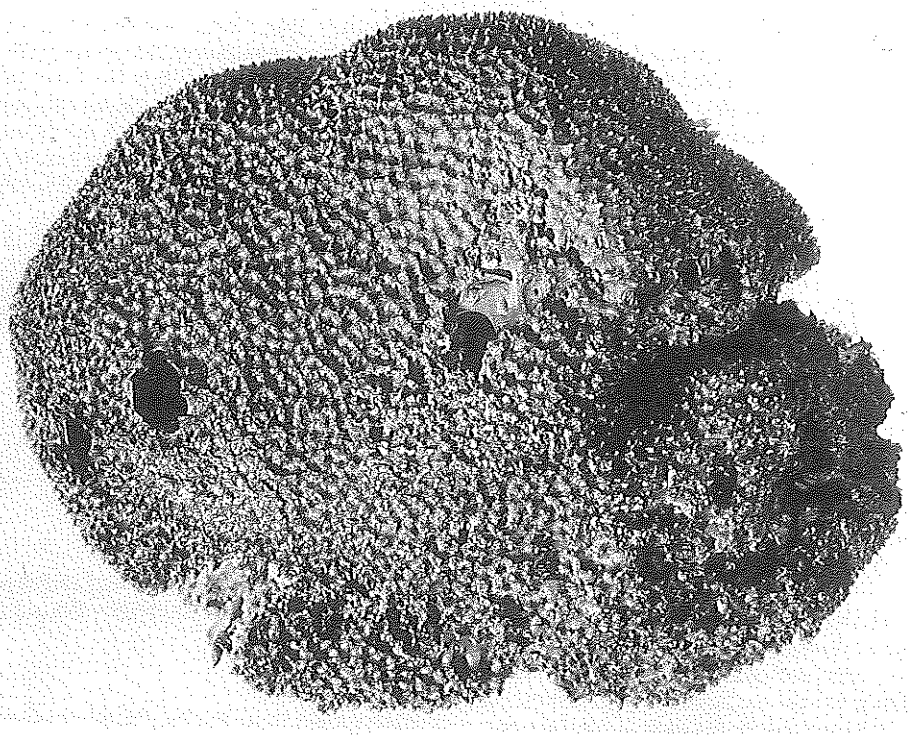
REMARKS
This species is well known and widespread. It has been described and figured by Bergquist et al. (1988).

DISTRIBUTION
Widespread Indo-Pacific, Northern Great Barrier Reef, Northern Reefs New Caledonia.

Family THORECTIDAE Bergquist, 1978

DIAGNOSTIC REMARKS
Dictyoceratida in which the spongin fibres making up the anastomosing skeleton are laminated in cross-section, with clear zones of disjunction between successive layers. The central region of each fibre is a more diffuse pith; it is not sharply disjunct from the investing more dense layer, as is the pith in the Verongida, but merges into the outer layer. A pith is always evident in the primary fibres and may or may not extend into the secondary elements of the skeleton. The fibre skeleton is often extremely regular, with almost perfectly rectangular meshes. Some fibres can become extremely stout. Primary fibres can be greatly reduced in number and are lacking in one genus. Choanocyte chambers are spherical and diplodal. The matrix is more collagenous than in the Spongiidae, and macroscopically appears slightly fleshy; its cellular composition can be complex, and some secretory cell types, the

FIG. 4. A-C, *Hyrtios reticulata* (Thiele). A. Preserved specimen (x 0.5). B, Photomicrograph showing coalescence of secondary fibres to produce a short primary tract below a conule (x 80). C, Photomicrograph showing the subdermal lacunae and the clear ectosomal choanosomal boundary (x 80).



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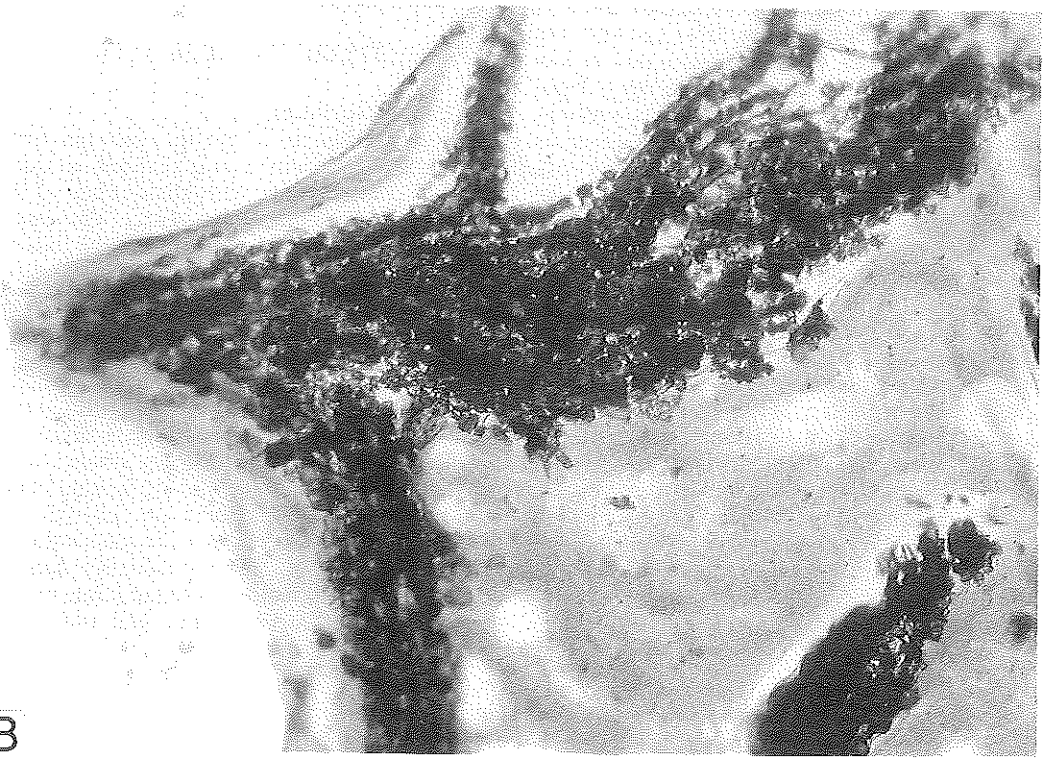

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spherulous cells, resemble those of the Verongida. The surface is often armoured in complex fashion, and is frequently thrown into ridges and hollows. Where unarmoured the surface is conulose, and may resemble closely that seen in Spongiidae. The sponge body is often tubular, organised around a series of long, cylindrical canals, and stalked. Yellowish or brick-red internal pigmentation with dark exterior is common. This diagnosis formally differentiates the families Thorectidae and Irciniidae, recognising consistent features of skeletal composition and terpene chemistry within the two groups. The referral of Thorectidae to Irciniidae by Hooper and Wiedenmayer (1994) is not upheld.

Hyrtios Duchassaing & Michelotti, 1864

Oligoceras Schulze, 1879; *Dysideopsis* Lendenfeld, 1888; *Heteronema* Keller, 1889; *Therectopsamma* Burton, 1934; *Inodes* de Laubenfels, 1957.

TYPE SPECIES

Hyrtios proteus Duchassaing & Michelotti, 1864, by subsequent designation of de Laubenfels (1936); re-described by van Soest (1978).

DIAGNOSTIC REMARKS

Thorectidae in which both primary and secondary fibres are fully charged with detritus to an extent which, in some species, can almost obscure the stratified nature of the spongin. The surface of the sponge always retains a distinctly conulose appearance, despite the presence in some species of extraneous detritus throughout the matrix. Primary fibres terminate in the conules, and as a consequence of the sandy inclusions these can appear whitish against the dark sponge surface. The primary skeleton can show some fasciculation near the surface. The texture of the sponge ranges from compressible to quite firm, even brittle, reflecting the degree of development of the skeleton, which in some species can be irregular and reduced, and the extent to which matrix debris is accumulated.

Hyrtios reticulata (Thiele)
(Fig. 4A-C)

Dysideopsis reticulata Thiele, 1899: 28, pl.3, Fig. 7.
Hyrtios elegans (pars) Bergquist, 1980: 462.

MATERIAL EXAMINED

HOLOTYPE: BMNH. 08.9.24.213 (ex Berlin).

ADDITIONAL MATERIAL: ORSTOM (R167, R601) Stn.117, Baie de Brony, 22°21'23S, 166°49'30E, 35 - 40m depth, 30 Jun 1976. (R167), 15 Dec 1977 (R601). Coll. P. Laboute. QMG 304684, ORSTOM (R1315) Stn.323, Récif de Français 19°11'30S, 163°05'13E, 45m depth, 23 Aug 1981. Coll. P. Laboute.

DESCRIPTION

The type description of this species is very brief but with the photograph given by Thiele (1899), and reference to the type specimen, it is possible to assign the New Caledonian specimens to *H. reticulata* with certainty.

The sponge is repent, with cylindrical branches extending upright from the more flattened base. The largest specimen (R.1315) is 40cm long, 15cm wide with individual branches up to 12cm high and 1.5cm in diameter. The sponge is loosely adherent to coral rubble attached at points, but clear of the subtrate over most of the basal area. Oscules are 2-5mm in diameter, flush with the surface and scattered over both base and erect branches. A circular area of clear dermal membrane surrounds each oscule. The texture is firm, just compressible. Colour in life gray (yY-R^5/2) to yellow brown (yY-R^5/6), in spirit the same. Internal pigmentation is the same.

Surface. The dominant features of the surface are the tracery of radiating ridges extending between conules and the regular distribution of conules themselves. These are sharply pointed and simple rather than multi-tuberculate. They extend 0.3-1.0mm above the sponge surface and give an overall speckled white appearance as a result of exposed fibre coring material.

Skeleton. The skeleton is a compact regular polygonal network of cored fibres, 10-50μm in diameter in which no clear primary fibres are developed except where sectors of the secondary network condense to form a short tract which supports each surface conule. The dermal layer is clear of debris, but a fine layer of debris is organised in the immediate subdermal region. Rare short sections of fibre lack coring material. Clear spongin is always found external to the detrital core of each fibre, and the fibre stratification characteristic of the family Thorectidae is evident. In some other species of *Hyrtios,* fibres are heavily loaded with detritus and structure is dif-

FIG. 5. A,B, *Hyrtios erecta* (Keller). A, apical view of preserved specimen (x 1.0). B, Photomicrograph to show primary and secondary fibres (x 80).

ficult to discern. Detritus extraneous to fibres is absent except in the immediate subdermal region.

Soft tissue organisation. An ectosomal region is clearly set off from the choanosomal region. It is up to 1500µm deep and constituted by the subdermal sandy layer which is supported by a light deposition of collagen. Deep to this is a well developed system of subdermal canals interrupted by thin collagen reinforced tissue tracts. Between conules the skeletal network ends abruptly deep to the canal layer, while below each conule the skeletal reticulum extends to the surface. Choanocyte chambers are spherical, 20-35µm in diameter.

REMARKS

The genus *Dysideopsis* was relegated in synonomy to *Hyrtios* by Bergquist (1980). An attempt was made at that time to assign the species described in *Dysideopsis* to *Hyrtios*, to other genera, or to pronounce them as unrecognisable. *D. reticulata* Thiele was deemed to be identical to *Dysideopsis elegans* Lendenfeld, type species of *Dysideopsis*. Type material of these species, and of the closely related species *Coscinoderma alta*, Polajaeff has been re-examined in the course of this work. As a result, and with the addition of further specimens, it is now proposed to treat all three as distinct species of *Hyrtios*.

Hyrtios is a widespread genus in the Indo Pacific, reaching from the Red Sea (*H. erecta*) to Palau (*H. erecta*), extending into southern oceans on the West Coast of Australia (*H. elegans*) and in Tristan de Cuhna (*H. altus*), represented in the Tropical Central Pacific (Celebes and New Caledonia,) by *H. reticulata*. *Hyrtios erecta* grows to large size, has thick branches (up to 2.5cm diameter), a prominent tracery of dermal tracts and stout, irregular debris packed fibres. It is usually digitate but can be massive and has firm, non-compressible texture. *H. altus* is digitate, has very fine branches 0.8cm in diameter, compressible texture, a strongly conulose surface and fine regular debris packed fibres in which there is no distinction between primary and secondary elements.

H. elegans is very similar to *H. altus* but has short, thick primary fibre tracts identifiable beneath each conule. It is possible that these species are the same, however given the distribution, Port Denison, West Australia for *elegans* and Tristan de Cuhna at 220m depth for *altus*, and the lack of fresh material of either species, the distinction is maintained.

H. reticulata is a clearly distinct species, ramose to digitate with somewhat flattened branches arising from a repent base, harsh in texture like *H. erecta*, having a regular polygonal network of fibres of very uniform dimension which cannot be distinguished as primary or secondary.

From the published descriptions, *Dysidea fusca* Ridley from Torres Strait could be confused with *H. reticulata*. Examination of the type specimen (BMNH 82.2.23.203) confirms that it is a *Dysidea*.

DISTRIBUTION

Celebes, New Caledonia.

Hyrtios erecta (Keller)
(Fig. 5A, B)

Heteronema erecta Keller, 1889: 339; Bergquist, 1965: 129, fig. 2.

Thorectopsamma mela de Laubenfels, 1954: 29, fig. 15, p.8, fig. 6.

Hyrtios erecta Bergquist, 1980: 462, fig. 7e.

MATERIAL EXAMINED

ORSTOM (R1258) Stn. 276, Lagon est, 20°39'00S, 166°26'30E, 20-30m depth, 21 May 1980. Coll. P. Laboute.

REMARKS

The species is common across the Indo Pacific and is well figured and described by de Laubenfels (1954) and Bergquist (1965).

DISTRIBUTION

Indo Pacific (Red Sea to Palau), Great Barrier Reef, Papua New Guinea, New Caledonia.

Petrosaspongia gen. nov.

TYPE SPECIES

Petrosaspongia nigra sp. nov.

DIAGNOSIS

Thorectidae in which cored primary fibres are greatly reduced as a skeletal element, particularly in the choanosomal region. They are most evident in the ectosomal region and form by condensation of many secondary fibres. Coring material is regular and occupies approximately half of the fibre diameter. Secondary fibres form a very dense irregular network and are uncored. The surface is finely and regularly conulose, and encrusted by a fine, evenly dispersed sand layer. The external pigmentation is jet black, the interior is beige to pale

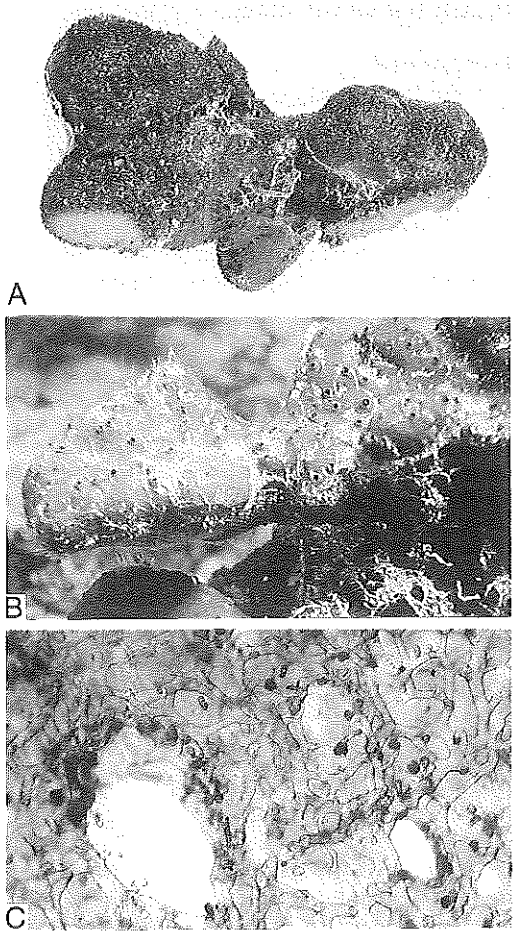


FIG. 6. A-C, *Petrosaspongia nigra* sp. nov. A, Holotype QMG304685, preserved specimen (x 0.25). B, Holotype QMG304685, in situ (x 0.5). C, Photomicrograph showing the dense secondary fibre skeleton and interstitial debris (x 50).

yellow. As a result of the density of the secondary network and the incorporation of moderate amounts of interstitial debris throughout the sponge, the texture is extremely hard and incompressible.

REMARKS

Within the Thorectidae as presently construed, *Petraspongia* is closest to *Hyrtios* from which it differs in density of the irregular skeletal reticulum, having uncored secondary fibres which form a very dense network, in the absence of coring material in the secondary fibres, and in having distinct, but reduced, primary cored fibres. This relationship to *Hyrtios* extends to the secondary metabolite content. Both contain sesterterpenes of similar structure (Lal et al., 1994).

ETYMOLOGY

The generic name refers to the hard incompressible texture.

Petrosaspongia nigra sp. nov.
(Fig. 6A-C)

MATERIAL EXAMINED

HOLOTYPE: QMG 304685 ORSTOM (R1325). Stn. 133, Passe de Boulari, 22°29'07S, 166°26'00E, 12m. depth, 18 October 1981. Coll. P. Laboute.

PARATYPES: ORSTOM (R1320) Stn. 326, Récife d'Entre casteaux, Isle Huon, 18°08'40S, 162°49'50E, 38m., 26 August 1981. Coll. G. Bargibant. ORSTOM (R321) Stn. 196, Récife barrière M'Bere. 22°18'07S, 166°11'06E, 10-15m. depth, 9 November 1977. Coll. P. Laboute.

DIAGNOSIS

As for genus.

DESCRIPTION

Three specimens of this species were available in the ORSTOM collections and a further collection was made by the author. The sponge is massive spreading, with thick interlacing lobes arising from a spreading base. Individuals are large, covering an area of 50cm by 60cm and extending 20cm above the attachment base. Oscules are small, 1.0-2.5mm in diameter, flush with the surface, and scattered over the body. Colour in life is jet black externally, internally pale yellow ($rY^7/4$) to beige ($rY^8/4$), in spirit the same. The texture is hard, incompressible, and the surface has a brittle, rough aspect.

Surface. The surface is finely and evenly conulose. Conules are small, 0.2-0.3mm high, each with a fine projecting fibre rendering the surface rough to the touch.

Skeleton. The skeletal network is extremely dense, made up predominantly of tightly interlocking, strongly laminated, uncored secondary fibres. The arrangement is polygonal, irregular. Primary fibres are short, cored and arise only 800-1000μm below the surface when sectors of the secondary skeleton fuse to form a fenestrated spongin plate, from which primary elements extend to the surface. Primary fibres are 90-110μm in diameter. The predominant secondary fibres are 25-60μm in diameter, but some very fine

fibres 8-10μm in diameter occur, and in places almost constitute a tertiary network. The fine fibres do not occur throughout the skeleton. Considerable quantities of debris are scattered throughout the choanosome and along canals.

Soft tissue organisation. An ectosomal region 200-500μm deep is clearly set off from the choanosomal area. It is packed with pigment containing cells and has light, even collagen distribution. The choanosome has very light, even collagen deposition, choanocyte chambers are small, and spherical 20-25μm in diameter. Lacunae formed by subsurface canals can extend up to 1600μm below the surface membrane.

ETYMOLOGY

The species name describes the pigmentation of the sponge.

DISTRIBUTION

Known only from New Caledonia.

Luffariella Thiele, 1899

TYPE SPECIES

Luffaria variabilis Polajaeff, 1884, by subsequent designation of Thiele (1899).

DIAGNOSTIC REMARKS

Thorectidae in which the cored primary and uncored secondary fibre reticulation is supplemented by a fine tertiary network. The sponges otherwise are similar to *Hyrtios* and *Cacospongia*, having a fine conulose unarmoured surface and simple non-fasciculate primary fibres. The branching pattern of the secondary and tertiary skeleton is complex.

Luffariella caliculata sp. nov.
(Fig. 7A-D)

MATERIAL EXAMINED

HOLOTYPE: QMG 304686 ORSTOM (R293) Stn. 195, East Coast, Goro, 22°16'80S, 167°05'10E, 50m depth, 3 Nov 1977. Coll. P. Laboute.

DIAGNOSIS

Shallow cup-shaped *Luffariella* with very limited coring material in the primary skeleton, fasciculation of fibres near the surface and extremely fine tertiary fibres.

DESCRIPTION

A shallow cup shaped sponge, 14cm in diameter and 15cm high, arising from an attachment base 4.0cm in diameter. The body shape is regular, and the upper oscular surface is thrown into low undulations. Oscules are very evenly dispersed and are slightly depressed below the body surface. They are organised as oscular complexes with three to six exhalant canals opening to each one. The pale cream internal tissue ($rY^8/4$) visible through each oscule contrasts with the golden brown external pigmentation ($Y\text{-}R\text{-}Y^6/4$) and gives the sponge a characteristic speckled appearance. The texture is compressible and springy.

Surface. The surface is covered with fine low conules 0.5-1.0mm high on the lower, poral face; these are larger and less regular in arrangement on the upper oscular face.

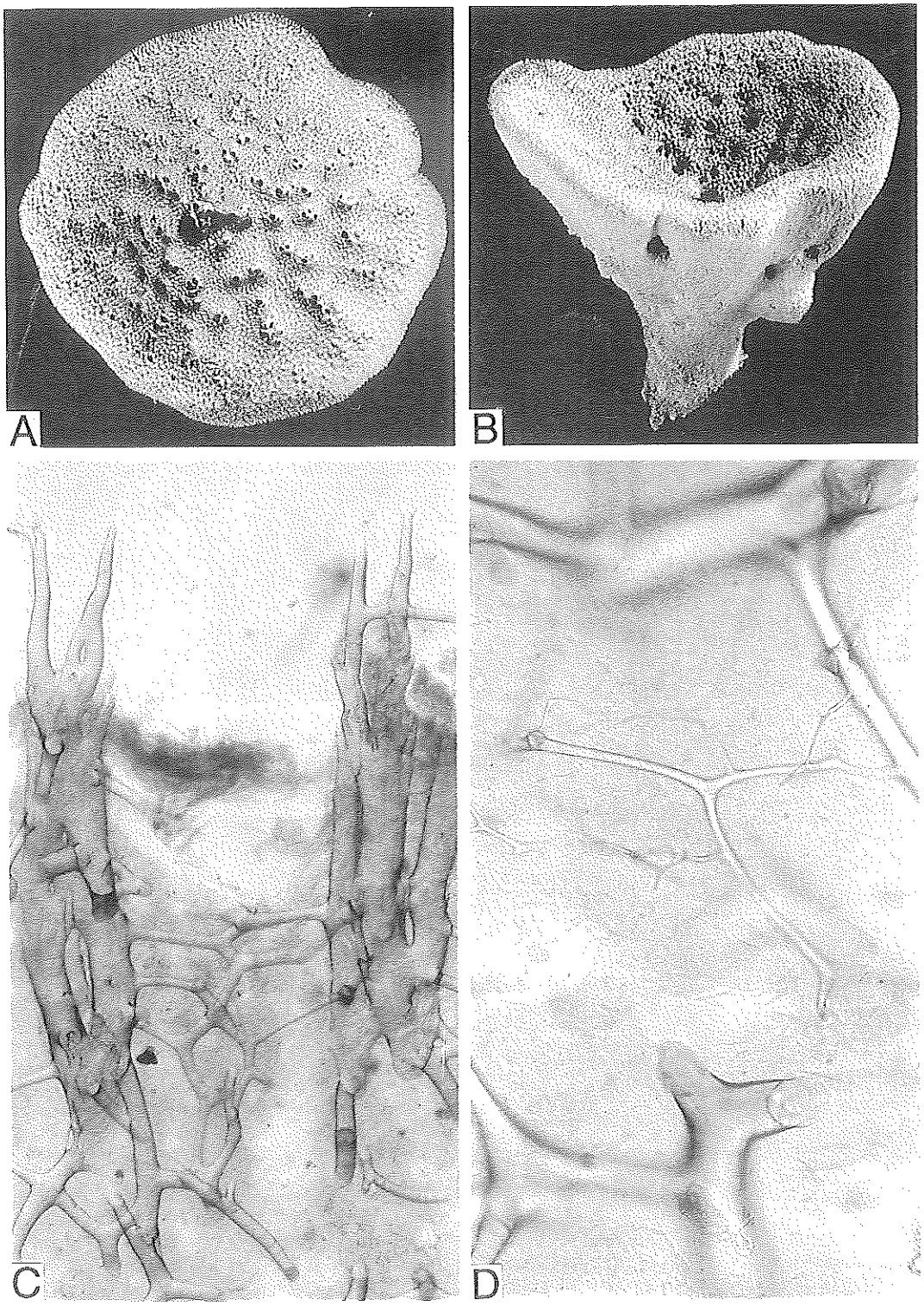
Skeleton. The skeleton is a regular, moderately dense network of primary fibres in which coring material is almost completely absent, only a few spicule fragments occuring. Near the surface the fibres attenuate to points and often divide to produce two or three terminal prongs. In the same region fibres can bifurcate and intertwine to produce short regions which are almost fasciculate. These features are also seen in the type species, *Luffariella variabilis* (holotype BMNH85.8.5.52). The secondary reticulum is quite regular approaching a rectangular arrangement, and is made up of uncored fibres. An extremely fine irregular tertiary fibre network is present. Primary fibres are 120-350μm in diameter, secondary fibres 10-50μm, and tertiary fibres 2-5μm in diameter.

Soft tissue organisation. A recognisable ectosomal region is present, it is 250-300μm deep, mainly occupied by large canals. The outer 80-100μm only is strongly collagen reinforced. The choanosome is only lightly infiltrated by collagen and choanocyte chambers are spherical, small and 15-25μm in diameter.

REMARKS

The growth form of the sponge, the paucity of coring material in the primary skeleton, the tendency to fasciculation of fibres near the surface,

FIG. 7. A-D, *Luffariella caliculata* sp. nov. A, Holotype QMG304686, apical view (x 0.3). B, Holotype QMG304686, side view (x 0.3). C, Photomicrograph showing primary fibres divided at the surface, secondary and tertiary fibres. (x 80). D, Photomicrograph showing detail of the tertiary network (x 200).


A
B
C
D

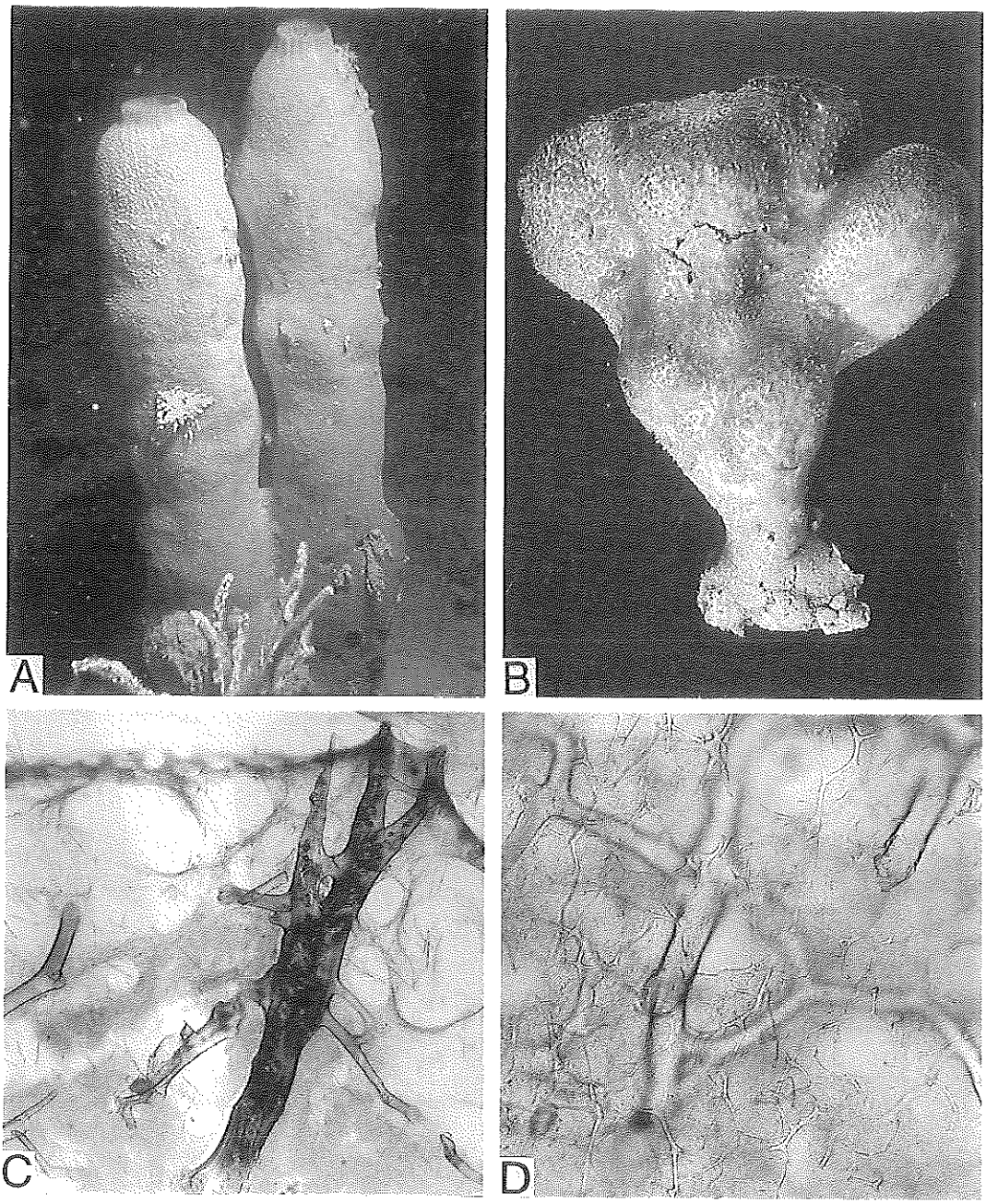


FIG. 8. A-D, *Luffariella cylindrica* sp. nov. A, Holotype QMG 304687, in situ (x 0.2). B, Paratype preserved specimen ORSTOM (R184) (x 0.5). C, Photomicrograph of primary fibres divided at the surface and secondary skeleton (x 80). D, Photomicrograph of secondary and tertiary network (x 200).

and the extremely fine tertiary fibres distinguish this sponge from other species of *Luffariella*. At present there are only two valid species of *Luffariella*, the type species *Luffariella variabilis* Poléjaeff recorded from the New Hebrides and Tahiti, and *L. geometrica* Kirkpatrick from Funafuti. The latter is a small cushion-shaped sponge with very regular skeleton, the former is massive or digitate with a dense skeleton. The genus is well characterised by the fine tertiary fibre network in conjunction with an unarmoured surface and simple, non-fasciculate primary fibres. The author has identified *L. variabilis* from Palau and Guam in addition to the type locality.

ETYMOLOGY

The specific name refers to the cup shape of the sponge.

DISTRIBUTION

Known only from New Caledonia.

Luffariella cylindrica sp. nov.
(Fig. 8A-D)

MATERIAL EXAMINED

HOLOTYPE: QMG304867, ORSTOM (R1085) Stn.114, Banc Gail, 22°22'04S, 166°39'02E, 35-38m depth, 29 Jun 1976. Coll. P. Bourret.

PARATYPE: ORSTOM (R184) Stn. 128, Passe de Dumbea, 22°22'04S, 166°15'40E, 30m depth, 13 Oct 1976.

DIAGNOSIS

Erect cylindrical *Luffariella* with primary fibres arranged in groups of 2 or 3 elements parallel to each other forming stout pallisades.

DESCRIPTION

An erect, cylindrical sponge up to 60cm high and 8cm in diameter, arising from an attachment base 3.0-5.0cm wide. The body shape can be regular or thickened at intervals to form smooth lumps. There is a single large apical osculum 1.5-5cm in diameter which is served by many exhalant canal apertures which open to a cavity which extends the entire distance to the sponge base. A prominent membrane surrounds the osculum. It extends vertically for 1.0 cm and is supported by extensions of the primary fibres. The texture is compressible, but firm and springy, and the sponge exudes copious mucus when handled. Colour in life is gray (yY-R ^{5}/2), and in spirit the same.

Surface. The surface is covered with fine, evenly-spaced, low conules each supported by several prongs of a primary fibre fascicle which tapers to a sharp point and projects above the surface membrane. There is no surface sand crust or cortex present.

Skeleton. The skeleton is an open network of lightly cored primary fibres, with clearly defined secondary and fine tertiary elements. Mesh arrangement is almost rectangular. The primary fibres are often arrayed in groups of two or three elements parallel to each other and connected by secondary fibres in a ladder-like array. The arrangement is not truly fasciculate, often split into two or three prongs at the surface. Primary fibres are 60-80µm in diameter, secondary fibres 20-30µm, and tertiary fibres 4-7µm in diameter. In the prominent oscular membrane, the primary fibres form stout palisades.

Soft tissue organisation. A distinct ectosomal region 250-350µm deep is marked by large canals separated by fine tissue tracts. The immediate subsurface region to a depth of 20-40µm is strongly infiltrated by collagen. The choanosome is only lightly reinforced by collagen and choanocyte chambers are spherical and small, 15-20µm in diameter.

REMARKS

Luffariella cylindrica is distinct from other species of the genus in its tubular habit and in the arrangement of the primary fibres.

ETYMOLOGY

The specific name refers to the cylindrical habit of the sponge.

DISTRIBUTION

Known only from New Caledonia.

Fascaplysinopsis Bergquist, 1980

TYPE SPECIES

Aplysinopsis reticulata Hentschel, by original designation.

DIAGNOSTIC REMARKS

Thorectidae in which the primary fibres are fasciculate and cored with detritus. The secondary fibres are not cored, and branch in irregular fashion; they do not form a rectangular-meshed skeleton. Adjacent components of the primary fascicles are sometimes joined in ladder-like fashion, recalling the simple skeletal arrangement seen in *Thorecta* and *Thorectandra*. All fibres are very thick, with primary columns reaching 5.0mm and secondary connectives

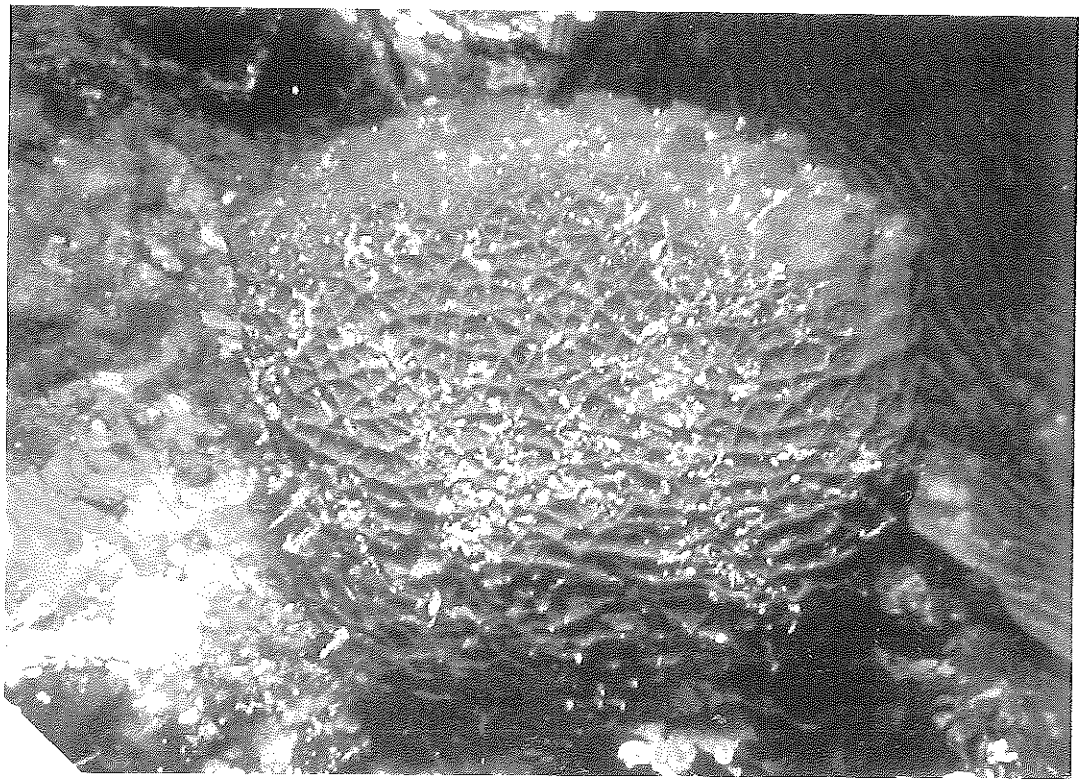


FIG. 9. *Fascaplysinopsis reticulata* (Hentschel) ORSTOM (R1344), in situ (x 0.5).

1.5mm. Pith is visible in all fibres. The sponge is cavernous but the texture in life is firm, and in alcohol hard, because of the coarse nature of the fibres. The surface is marked by prominent conules and a delicate superficial tracery of sand; there is no complete sand cortex. There is marked differential pigmentation, the surface being shiny black and the interior pale lemon yellow ($Y^8/8$). The gelatinous consistency of the matrix is a notable characteristic of the genus.

Fascaplysinopsis reticulata (Hentschel)
(Fig. 9)

Aplysinopsis reticulata Hentschel 1912: 56, pl. xv(1), xvi (9).

MATERIAL EXAMINED

QMG304688, ORSTOM (R1344) Stn. 422, Iles Chesterfield, 20°58'10S, 158°34'60E, 40m depth, 21 Jul 1984. Coll. J .L. Menou.

REMARKS

The prominent surface tracery of conules and connecting ridges is well shown in this specimen.

DISTRIBUTION

Aru Island, Northern Great Barrier Reef, New Caledonia.

Family IRCINIIDAE Gray, 1867

Dictyoceratida in which the fibres making up the anastomosing skeleton are laminated in cross section and have a central pith region. These features are often obscured by the incorporation of large quantities of debris in the fibre skeleton and interstitially. The skeleton is irregular in arrangement and the primary fibres are always fasciculate, often forming very complex arrays. The secondary fibres are in general, uncored. A third element of the skeleton consists of fine collagenous filaments which are separate from the spongin fibre skeleton and which are dispersed in wavy to tangled tracts throughout the mesohyl.

Filaments have terminal knobs, are sometimes studded with lepidocrocite granules and are made up of a collagen distinct from that found in the mesohyl matrix or in the fibres. The sponges are massive, lobate, spherical, digitate, cup shaped, encrusting always with a conulose surface except in forms which have an organised superficial sand crust, in which case the conules can be reduced to mammiform protruberences. The presence of the filaments renders the sponges very tough, almost impossible to tear. The choanocyte chambers are spherical and diplodal and the mesohyl, like that of the Spongiidae is only lightly infiltrated with collagen.

REMARKS

The family Irciniidae was established as Hircinidae by Gray (1867), and used by Lendenfeld (1888) as Hircinidae. Since *Hircinia* is a synonym of *Ircinia* (Burton 1934) the family name Irciniidae applies. Bergquist (1978) established the family Thorectidae in a revision in 1980 and included *Ircinia* and allied genera in it. It has been noted, Bergquist and Wells (1983), that *Ircinia*, *Sarcotragus* and *Psammocinia* represented a distinct sub-group within that large assemblage. The evidence is sufficient to sustain separate family status, and that is formally done in this work (refer Thorectidae earlier).

Ircinia Nardo, 1833

Hircinia Nardo, 1834; *Stematumenia* Bowerbank, 1845; *Filifera* Lieberkuhn, 1859; *Polytherses* Duchassaing & Michelotti, 1864; *Euricinia* Lendenfeld, 1889.

TYPE SPECIES

Spongia fasciculata Pallas, 1766 *sensu* Schmidt (1862), by subsequent designation of de Laubenfels (1936).

DIAGNOSTIC REMARKS

Irciniidae in which primary fibres are cored with detritus and frequently attain great size by being woven into complex fascicles. Secondary fibres are simple and uncored. The matrix is charged with fine collagenous filaments. These are usually terminally knobbed, around 10-15µm in diameter, although thicker filaments have been recorded. The sponge surface is marked by prominent conules, and is unarmoured. In texture the sponge is extremely tough, and difficult to cut or tear.

Ircinia irregularis (Poléjaeff) (Fig. 10A, B)

Cacospongia irregularis Poléjaeff, 1884: 63, pl.vi, fig.10., pl. viii, fig.5.
Hircinia irregularis Burton, 1934: 578.
nec *Hircinia gigantea* Lendenfeld, 1889: 588, pl.xxvii, fig 7, pl.xxviii, fig.2, pl.xxxvi, figs. 1,6,10.

MATERIAL EXAMINED

HOLOTYPE: BMNH 85.8.8.37.
PARATYPES: ORSTOM (R166), Stn. 146, Ilot Sainte Marie, 22°17'08S, 166°29'02E, 9-15m depth, 7 Sept 1976. Coll. P. Bourret.

REMARKS

This species has been the subject of confusion since Lendenfeld merged it, in part, with his *Ircinia gigantea* from South Eastern Australia. Since Poléjaeff had only one specimen it is difficult to see how this action could be justified. *Ircinia irregularis* is the name which should be applied to the large, cushion shaped *Ircinias* with apical oscular clusters and strongly conulose surfaces which occur along the Great Barrier Reef, and extend to New Caledonia.

DISTRIBUTION

Torres Strait, Great Barrier Reef, New Caledonia.

Psammocinia Lendenfeld, 1889

TYPE SPECIES

Ircinia halmiformis Lendenfeld, 1889, by original designation.

Irciniidae which contain the fine interstitial filaments typical of *Ircinia* and *Sarcotragus* but which incorporate a large quantity of sand in fibres, matrix, and also as a thick superficial cortex. Many of the sand grains in the fibres are very large, coated individually with spongin and linked to the skeletal fibres by spongin strands. Fibres are only weakly fasciculate, and are often almost obscured by the accumulation of sand. Texture firm, sometimes brittle; the surface is either covered with rounded tubercles or pitted.

Psammocinia bulbosa sp. nov. (Fig. 11A-C)

MATERIAL EXAMINED

HOLOTYPE: QMG304689 ORSTOM (R1357). Stn.196, Récife barrière M'Bere, 22°18'07S, 166°11'06E, 10-75m depth, 9 Nov 1977. Coll. P. Laboute.

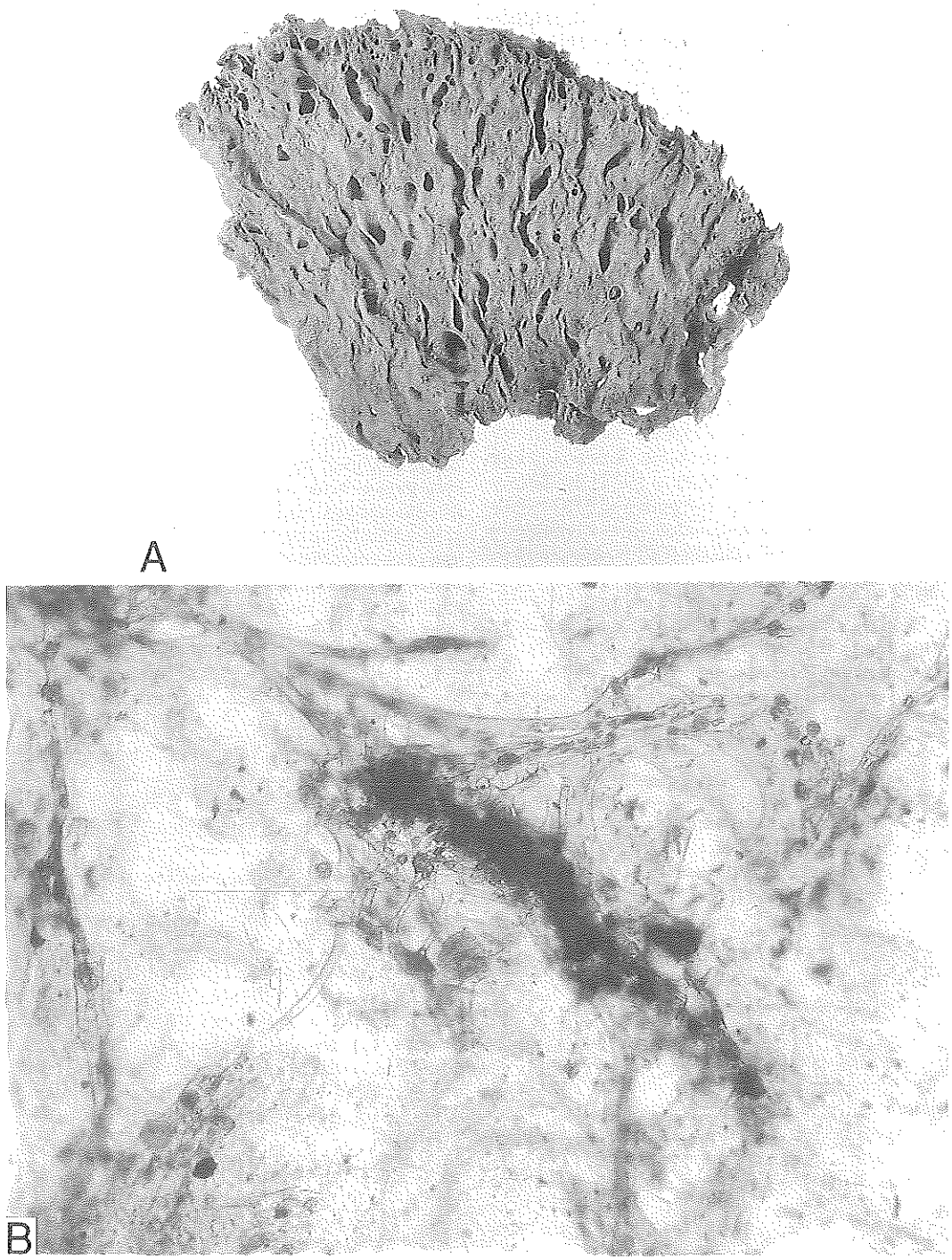


FIG. 10. A,B, *Ircinia irregularis* (Poléjaeff). A, ORSTOM (R166) vertical slice, preserved specimen (x 0.5). B, Photomicrograph showing primary and secondary skeleton (x 100).

OTHER MATERIAL: ORSTOM (R331, R393) Stn. 114, Banc Gail, 22°22'04 S., 166°39'02 E., 35-38m depth, 29 Jun 1976. Coll. P. Bourret. ORSTOM (R573) Stn.181, Ilot Maitre, platier, 22°20'20S, 166°25'00E, 0.2-1.5m depth, 4 May 1977. Coll. P. Laboute. ORSTOM (R1273) Stn. 230, Passe de la Gazelle, 20°22'30S, 163°55'60 E., 12-50m depth, 30 Aug 1978. Coll. P. Laboute.

DIAGNOSIS

Massive repent *Psammocinia* with long oscular fistules and cored secondary fibres.

DESCRIPTION

The type specimen is a massive, repent sponge 20cm long, 3cm thick and 6cm wide, loosely attached to coral substrate. The body is in the form of a series of bulbous expansions from each of which one or two erect tapering oscular fistules arise. Osules are 2-5mm in diameter and are found flush with the surface as well as at the tip of the fistules. The texture is firm and crisp, just compressible and the colour in life is grayish white ($Y^8/2$) in spirit cream ($rY^8/4$).

Surface. The surface is covered with regularly spaced low conules 0.5-1mm high with rounded rather than pointed tips. A papery texture characterises the well developed sandy surface crust which is up to 1.0mm thick.

Skeleton. The skeleton is a loose irregular network of cored primary columns in which fibres twine, branch and interlock to make up stout fasciculate columns up to 700µm across. The secondary fibres are also irregularly arranged 30-50µm in diameter and are mainly cored, very few being clear of debris. The collagen filaments are very dense, fine, 3-5µm in diameter and terminated by spherical knobs. Debris extraneous to the fibres occurs only in the subdermal region.

Soft tissue organisation. The ectosomal region is made up of the sandy cortical crust which is up to 1mm deep, and an underlying region of lacunae formed by exhalant canals. Choanocyte chambers are spherical 20-30µm in diameter. Collagen deposition is light throughout the sponge.

REMARKS

Other species of *Psammocinia* are either cup shaped, encrusting or irregularly lamellate. *P. bulbosa* with its unusual shape, long oscular fistules and cored secondary fibres is quite distinct. No species have been described in the allied genera *Ircinia* and *Sarcotragus* which approach the present sponge in morphology.

ETYMOLOGY

The species name emphasises the bulbous body shape.

DISTRIBUTION

Known only from New Caledonia.

Family DYSIDEIDAE Gray, 1867

DIAGNOSTIC REMARKS

Dictyoceratida in which the spongin fibres making up the anastomosing skeleton are concentrically stratified to varying degrees. As in some members of the Ircinidae, this character is affected in development by the extent to which the sponge incorporates coarse detritus into the fibres. Pith components, as optically distinct central regions of the fibres, are evident except where fibres are detritus-packed. The choanocyte chambers are eurypylous, and the matrix contains only light collagen reinforcing. The sponges are histologically simple, with few secretory cell types present. The sponge texture is soft and compressible unless rendered brittle by interstitial detritus. Incorporation of debris into both fibres and matrix is frequent. The sponge surface is always conulose, but the size and arrangement of conules may range from very small, fine, and even (*Spongionella nigra, Dysidea herbacea)* to large and irregular (*Dysidea avara*).

Dysidea Johnston, 1842

Duseideia Johnston, 1842; *Dysidia* Agassiz, 1846; *Spongelia* Nardo, 1847; *Dyseideia* Lieberkuhn, 1859; *Sarcocornea* Carter, 1859; *Halmopsis* Lendenfeld, 1885; *Haastia* Lendenfeld, 1889; *Duseidea* Delage, 1899

DIAGNOSIS

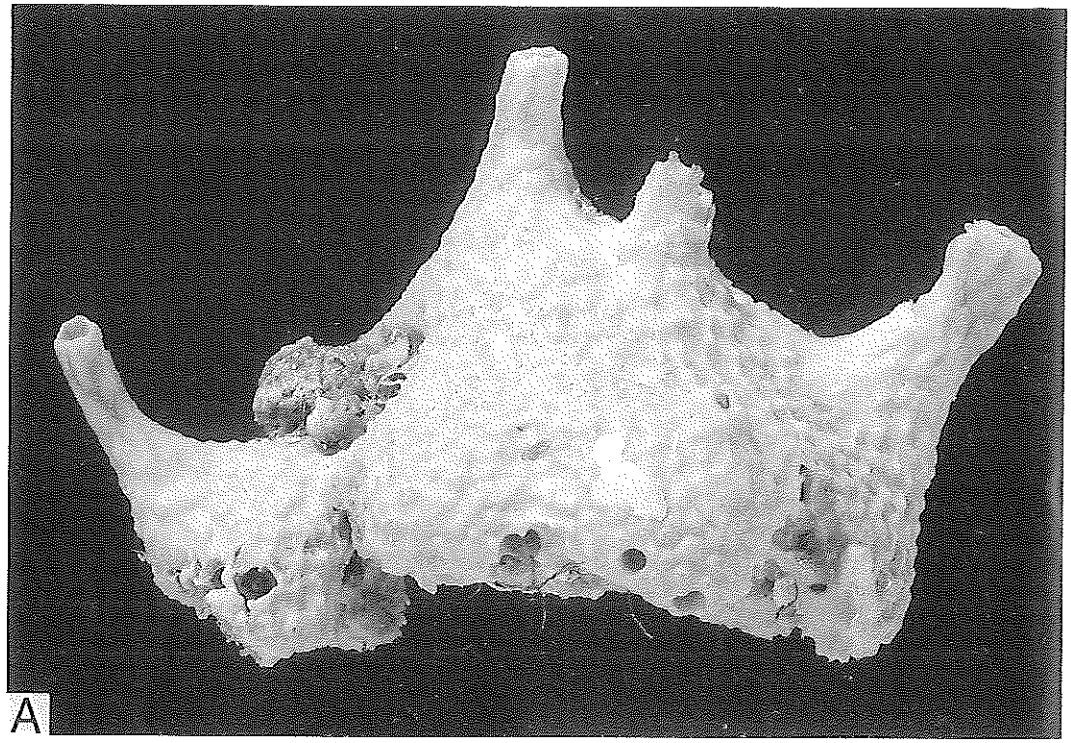
Dysideidae in which all fibres are filled with detritus.

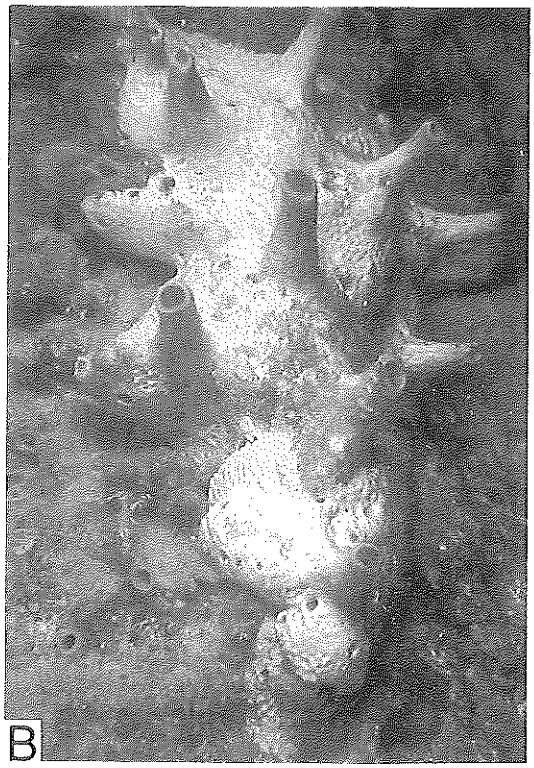
TYPE SPECIES

Dysidea fragilis Montagu, 1814, by subsequent designation (Burton 1934).

overleaf

FIG. 11. A-C, *Psammocinia bulbosa* sp. nov. A, Holotype QMG304689, preserved specimen, side view (x 1.5). B, Holotype QMG304689, in situ (x 0.5). C, Photomicrograph of sand cortex and fasciculate skeletal elements (x 80).


A


B


C

Dysidea herbacea (Keller)

Spongelia herbacea Keller, 1889: 336, pl.20, Fig. 1.
Dysidea herbacea Bergquist, 1965: 140, Fig. 7a,b,c.

MATERIAL EXAMINED
ORSTOM (R158) Stn.198, Chenal des cinq milles, 22°30'04S, 166°45'04E, 25-40m depth, 15 February 1978. Coll. G. Bargibant.

REMARKS
This species is widespread throughout the Indo Pacific region and has a range of colour from gray green to green, and growth form from simple spreading mats with digitate or lamellate extensions to complex, soft, often interlocking lamellae.

The species has been confused with other *Dysidea* species, particularly *Dysidea chlorea* (de Laubenfels) and others yet to be described. The structure of the fibres (cf. Bergquist 1965, Fig. 7c) and the nature of the symbiotic cyanobacteria with which the sponge mesohyl is packed do not vary and serve to characterise *D. herbacea*.

DISTRIBUTION
Red Sea, Indian Ocean, Australia, Micronesia, Fiji.

Dysidea arenaria Bergquist
(Fig. 12)

Dysidea arenaria Bergquist, 1965: 144, Fig. 10 a, b.

MATERIAL EXAMINED
ORSTOM (R28, R30) Stn. 160, Ilot Maitre, 22°20'00S, 166°23'09E, 10m depth, 13 Oct 1976. Coll. P. Laboute. QMG 304690, 92-Ed-MI-10, 92-Ed-MI-14, Stn. 268, Ilot Maitre, 22°20'02S, 166°22'50E, 19m depth, 13 Oct 1992. Coll. C. Battershill.

REMARKS
This species is very common on the sandy substrate of subtidal *Halimeda* beds. It has been described and figured adequately by Bergquist (1965). The colour of the sponge in life can now be recorded as light gray ($gY^7/2$) to pale mauve ($bP^8/2$).

DISTRIBUTION
Palau Is, New Caledonia.

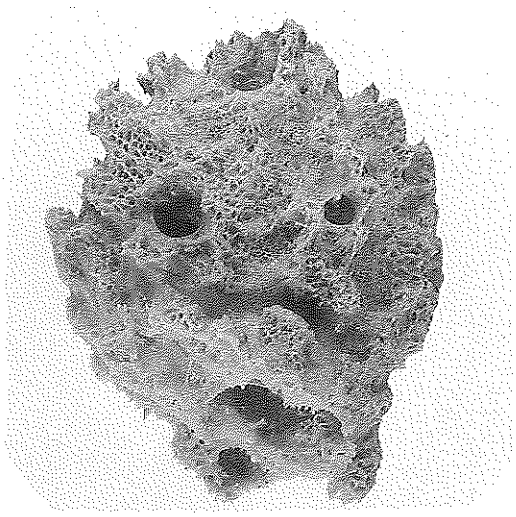


FIG. 12. *Dysidea arenaria* Bergquist, preserved specimen (x 2.0).

Dysidea nigrescens sp. nov.
(Fig. 13)

MATERIAL EXAMINED
HOLOTYPE: QMG304691 ORSTOM (R1252) Stn. 271, Entre L'ilot Téré and L'ilot Nda, 22°49'40S, 168°50'50E, 30m depth, 1 Apr 1980. Coll. P. Laboute.

DIAGNOSIS
Dysidea with a regular skeletal arrangement, low rounded conules and dark pigmentation throughout.

DESCRIPTION
A repent massive to lobate sponge 10cm long, 12cm wide and 3cm high loosely attached to coral rubble on a sandy lagoon bottom. Oscules are 2-5mm in diameter, situated apically on each lobe which arises from the sponge base. The texture is soft and friable and the sponge is easily torn. The colour is deep blackish purple in life ($rP^3/2$) and cream in spirit ($rY^8/4$).

Surface. The surface is very evenly covered with low rounded conules, 1mm high and wide, each of which is elevated by a single primary fibre. Between the conules the delicate dermal membrane is supported by a tracery of fine subdermal tracts. The apex of each conule is cream coloured where the sandy fibre content is exposed. This gives a very regular, light spotted appearance to the otherwise dark surface.

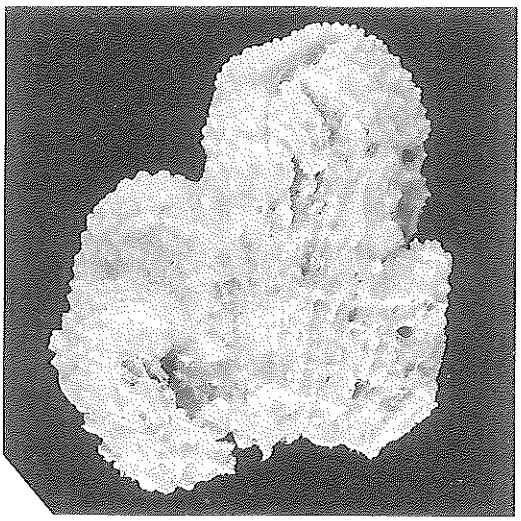


FIG. 13. *Dysidea nigrescens* sp. nov. Holotype QMG 304691, preserved specimen (x 2.0).

Skeleton. The skeleton is arranged on an almost perfect rectangular plan. The primary fibres are simple, not fasciculated and vary from 70 to 400µm in diameter, depending on the nature and extent of the debris incorporated. Secondary fibres are 40-100µm in diameter, always with some clear spongin visible around the coring material. The primary columns are spaced approximately 1 mm apart and the entire skeleton is thus a very fragile network.

Soft tissue organisation. The dermal membrane and ectosomal region are clear of debris and a well developed system of subdermal canals is present. The ectosomal region extends to a depth of 800µm and shows only traces of collagen deposition. The choanosome is lightly infiltratred with collagen and the mesohyl is filled with filamentous cyanobacteria. Choanocyte chambers are oval, eurypylous 120-180µm long and 50-80µm wide. No interstitial debris is present.

REMARKS

It is difficult to establish new species of *Dysidea* with certainty, particularly given the poor state of preservation of many type specimens and the very brief descriptions in the literature. This difficulty is compounded when the sponge does not have a distinctive morphology as is the case for example in *Dysidea herbacea* or *Dysidea arenaria.* The combination of a very dark, almost black pigmentation throughout the sponge, the very regular skeleton, and low rounded surface conules suffices to distinguish *D. nigrescens* from others of similar morphology.

ETYMOLOGY

The species name refers to the dark colour.

DISTRIBUTION

Known only from New Caledonia.

Dysidea frondosa sp. nov.
(Fig. 14A-C)

MATERIAL EXAMINED

HOLOTYPE: QMG304692 ORSTOM (R1246) Stn. 124, Ilot Maitre, 22°20'08S, 166°25'05E, 24m depth, 26 Mar 1980. Coll. P. Laboute.

DIAGNOSIS

Dysidea with a frondose habit, pink-purple colour in life and irregular superficial fibre tracery.

DESCRIPTION

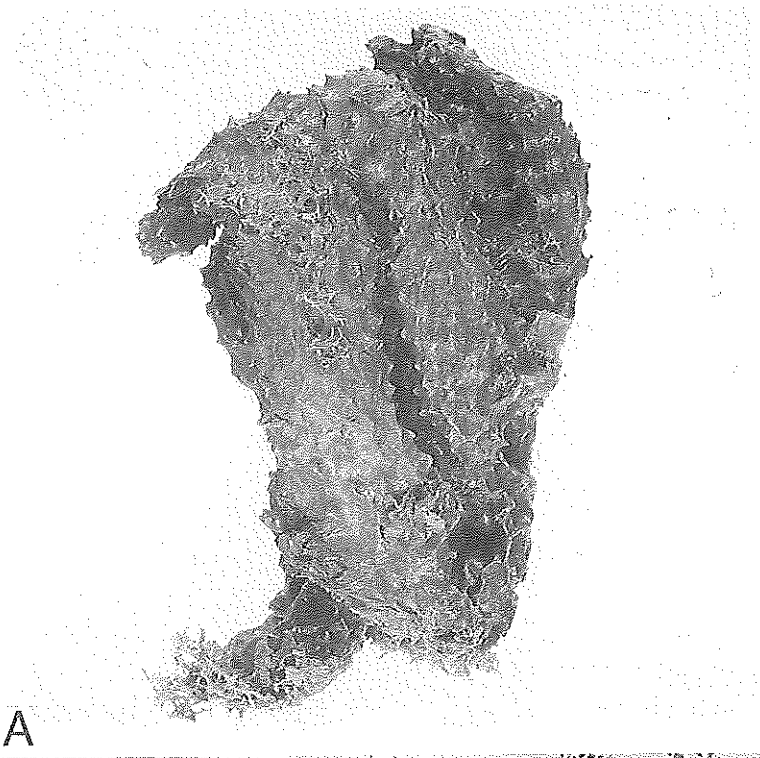
A repent sponge with multiple flattened lobate projections arising from a spreading base, it is 12 cm long, 8cm high and 6cm wide. Oscules are large, 3-6mm in diameter, flush with the surface and scattered. The texture is soft, flexible, easily torn. The colour in life is pink-purple ($yR^5/2$) and in spirit dark brown ($yY\text{-}R^3/2$).

Surface. The surface is characterised by low, irregularly distributed conules 1-1.5mm high, which have rounded or pointed tips. Sandy tracts running in the plane of the surface connect adjacent conules in some areas but not over the whole surface. These white tracts give an irregular web-like appearance to the surface.

Skeleton. All fibres are cored and it is not possible to distinguish between primary and secondary elements on the basis of size or orientation except in the immediate sub-surface area. The fibres are large, 120-400µm in diameter, heavily cored and strongly stratified, and make up an irregular network.

Soft tissue organisation. An ectosomal region 200-300µm deep is recognisable by the presence of exhalant canal lacunae and a denser superficial

FIG. 14. A-C, *Dysidea frondosa* sp. nov. A, Holotype QMG304692, preserved specimen (x 1.0). B, Photomicrograph of choanosome and a portion of the fibre skeleton (x 100). C, Photomicrograph showing choanocyte chambers and scattered pigment cells (x 300).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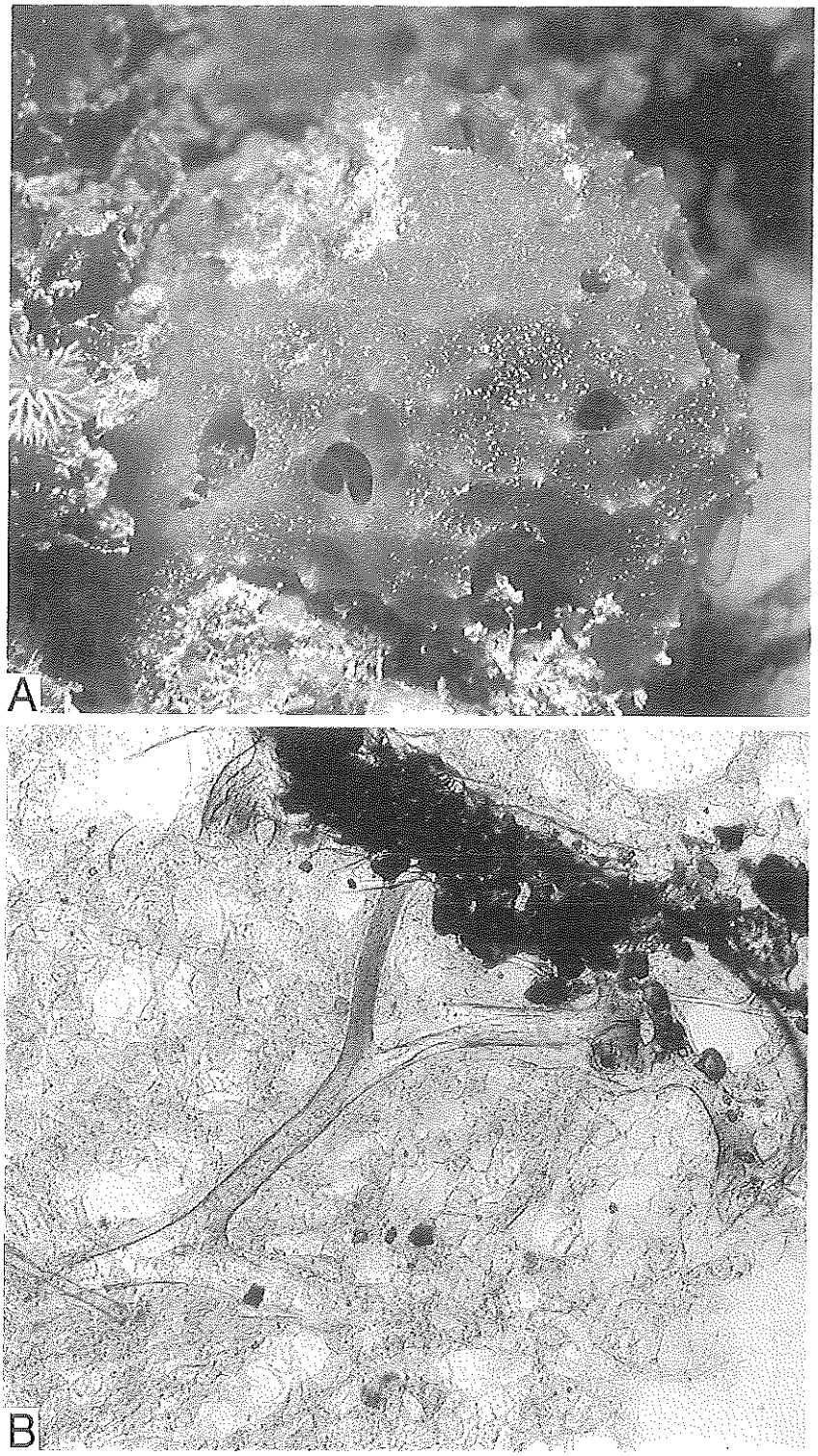

A
B

region 30-40µm deep of light collagen reinforcement. The choanosome has negligible collagen deposition and low mesohyl content, most volume being occupied by the oval eurypylous choanocyte chambers 50-80µm in maximum dimension, and canals. All areas of the sponge contain numerous dark brown pigmented cells. There is no interstitial debris.

REMARKS

The frondose habit in conjunction with the colour and prominent irregular, superficial fibre tracery distinguish this species from others in *Dysidea*.

ETYMOLOGY

The species name refers to the frondose habit of the sponge.

DISTRIBUTION

Known only from New Caledonia.

Euryspongia Row, 1911

DIAGNOSTIC REMARKS

Dysideidae in which the primary fibres are cored and the secondaries are clear of debris. The primary network is regular, the secondary is branching. The surface is usually marked by a very delicate superficial network extending between conules and pore areas.

TYPE SPECIES

Euryspongia lactea Row, 1911, by monotypy.

Euryspongia delicatula sp. nov.
(Fig. 15A,B)

MATERIAL EXAMINED

HOLOTYPE: QMG304693, ORSTOM (R1225) Stn. 184, Ilot Ue, 22°42'07S, 166°49'00E, 25m depth, 8 Jun 1977. Coll. P. Laboute.

DIAGNOSIS

Euryspongia having bright violet colour, low rounded conules, and a fasciculate primary skeleton.

DESCRIPTION

A massive sponge, 18cm long, 10cm wide and 8cm high, growing on coral from a broad attachment base. Oscules are 2-6mm in diameter, flush with the surface, solitary or aggregated in groups and dispersed over the entire surface. The texture is spongy, very compressible but tough. The colour in life is violet (PR-P^5/8) throughout, in spirit brown, the colour of spongin fibre (Y-R-Y^6/6).

Surface. The surface is characterised by evenly spaced rounded conules, 1-3mm high, elevated by single or multiple primary fibres. Between the conules fine subdermal tracts radiate under the fine dermal membrane and confer the cobweb-like appearance on the surface as noted in other *Euryspongia* species .

Skeleton. The skeleton is made up of cored primary fibres, which become strongly fasciculate in the immediate sub-surface region, and a loose, irregularly disposed network of clear secondary fibres. Primary fibres are 200-400µm in diameter, secondary fibres 50-120µm in diameter. All fibres are strongly stratified and a clear pith region is present, but is most evident in the uncored secondary elements. A small amount of interstitial debris is scattered throughout the body.

Soft tissue organisation. An ectosomal region 150-250µm deep is made up of subdermal lacunae overlain by a collagen reinforced region 60-80µm in extent. The choanosome has very light collagen deposition in the sparse mesohyl. It is made up largely of oval eurypylous choanocyte chambers, 80-120µm in greatest dimension, and of canals.

REMARKS

The brilliant violet colour, low rounded conules and fasciculate primary skeleton are the major features distinguishing this species from other species of *Euryspongia*, many of which are to date poorly described. Examination of the type species, *Euryspongia lactea* Row, from the Red Sea shows that the sponge is not like *Spongia* in skeletal characteristics as Row suggested. It has clearly stratified fibres with an evident pith and primary fibres with some fasciculation.

ETYMOLOGY

The species name refers to the delicate appearance of the sponge surface.

DISTRIBUTION

Known only from New Caledonia.

FIG. 15. A-B, *Euryspongia delicatula* sp. nov. A, Holotype QMG304693, in situ (x 0.5). B, Photomicrograph showing primary and secondary fibres (x 100).

Euryspongia vasiformis sp. nov.
(Fig. 16A, B)

MATERIAL EXAMINED
HOLOTYPE: QMG304694 ORSTOM (R812) Stn. 109, Baie de Citrons, 22°18'30S, 166°25'50E, 8-10m depth, 31 Mar 1978. Coll. G. Bargibant.
PARATYPE: ORSTOM (R1282) Stn. 383, Recife Toombo, Pente externe, 22°23'00S, 166°26'30E, 20-30m depth, 28 Apr 1981. Coll. P. Laboute.

DIAGNOSIS
Thin walled vase-like *Euryspongia* having an irregular disposition of the primary skeleton.

DESCRIPTION
An irregular cup shaped sponge 16cm high, 10cm in apical diameter with walls 4-8mm thick, growing attached to worm tubes and coral rubble on sandy *Halimeda* flats. Oscules are small, flush with the surface and scattered on both interior and exterior faces of the sponge. The texture is soft, flexible, easily torn. The colour in life is dark brown, (yY-R^4/2) in spirit identical.

Surface. Both interior and exterior surfaces are covered with closely spaced sharp conules 1-2m high, each supported by a single primary fibre. A prominent tracery of surface tracts connects adjacent conules and confers a web-like appearance on the surface. (See Bergquist 1980: fig. 19 a,b,d).

Skeleton. The skeleton is made up of lightly cored primary fibres which can be slightly fasciculate near the surface, and a loose open reticulum of uncored secondary fibres. The thin walled construction of the sponge influences the disposition of the primary tracts which often are disposed parallel to the surface before converging toward the conules. Primary fibres are 80-200µm in diameter, secondaries 40-120µm in diameter and all are markedly stratified. No interstitial debris is present.

Soft tissue organisation. An ectosomal region, 150-300µm deep is made up of subdermal canals overlain by a superficial, collagen reinforced layer 30-50µm deep. There is no evident collagen deposition in the choanosome, the volume being largely taken up by oval eurypylous choanocyte chambers, 60-90µm in maximum dimension, and by canals.

REMARKS
The thin walled vase-like construction of the sponge and the irregular disposition of the primary skeleton differentiate *E. vasiformis* from other species of *Euryspongia.*

ETYMOLOGY
The species name emphasises the vasiform shape of the sponge.

DISTRIBUTION
Known only from New Caledonia.

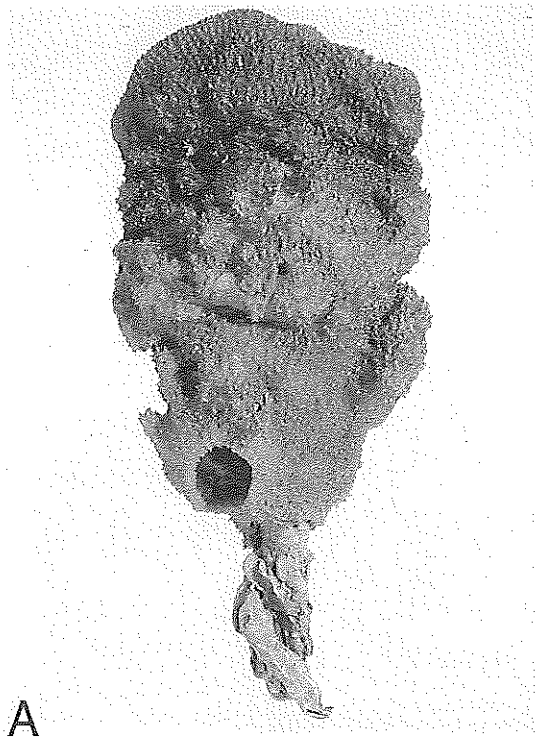
Order DENDROCERATIDA Minchin, 1900

DIAGNOSTIC REMARKS
Ceratinomorpha in which the fibre skeleton, though usually present, is reduced in relation to soft tissue and is entirely absent in one genus. The skeleton arises from a continuous spreading basal plate, and adopts either a dendritic or an anastomosing pattern. In anastomosing forms there is never any clear size distinction between primary and secondary elements. The fibres are always pithed and strongly laminated, usually quite stout, and frequently incorporate recognisable cellular (spongocyte) elements. Free fibrous spicules may occur in addition to the main skeleton. The choanocyte chambers are large and sac-like or tubular, elongate, and branched; matrix volume is low in relation to chamber and canal volume, and the matrix is only weakly infiltrated by collagen. This, in conjunction with the generally reduced fibre skeleton, makes the sponges soft and fragile. The pith in the fibres is markedly distinct from the bark elements, and in structure is close to that seen in the Verongida. It is common to find dark fibre pigmentation contrasting with the matrix pigmentation, which is always uniform throughout the sponge. Larvae are either large, incubated parenchymellae with complex structure and histology and always with a terminal clump of long cilia or (in one family) simple parenchymellae lacking terminal long cilia.

Family DARWINELLIDAE Merejkowsky, 1879

DIAGNOSTIC REMARKS
Dendroceratida in which the fibrous skeleton, where present, is completely dendritic and sometimes supplemented by spongin spicules which

FIG. 16. A-B, *Euryspongia vasiformis* sp. nov. A, Holotype QMG 304694, preserved specimen (x 0.5). B, Photomicrograph showing choanosome and primary and secondary fibres (x 100).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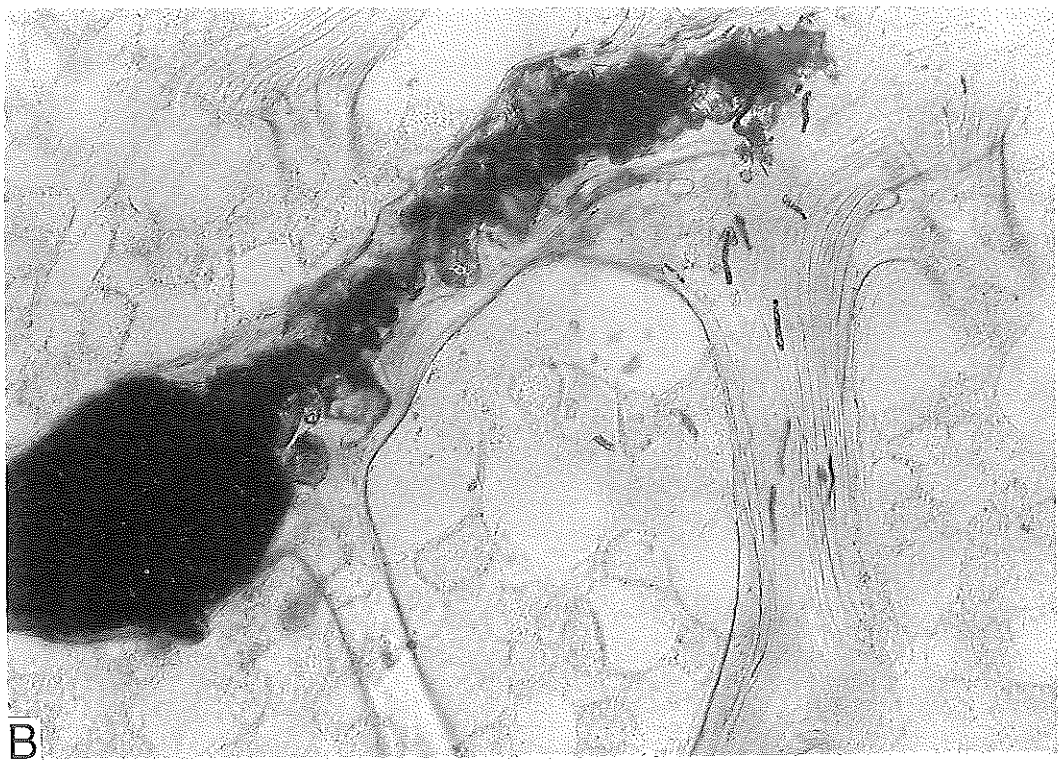
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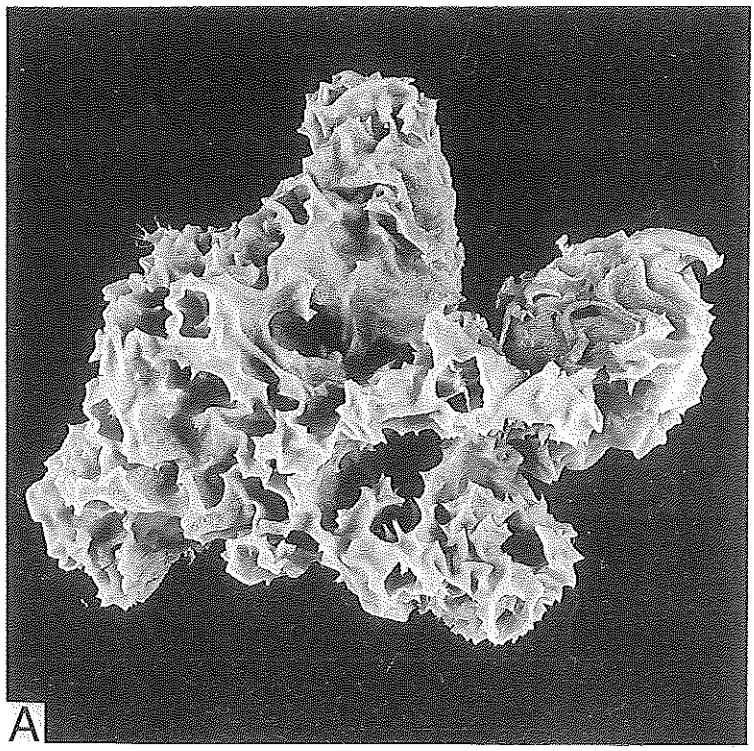

A


B


C

are not attached to the primary skeleton. Species are frequently encrusting but where massive or erect, their fibrous skeleton, like that of the encrusting forms, always arises from a flat basal spongin plate. The fibres are comparable to those of the Verongida in structure, with a laminated bark surrounding a central, markedly distinct pith. The pith can be partially replaced by coring material. As better descriptions of sponges belonging to this group have appeared, it has become clear that the family is cohesive and that the senior name Darwinellidae can be applied. This useage is well documented by Hooper and Wiedenmayer (1994).

Chelonaplysilla de Laubenfels, 1948

TYPE SPECIES

Chelonaplysilla nævus (Carter, 1876) by original designation.

DIAGNOSTIC REMARKS

Darwinellidae which have a separable cortex reinforced by a delicate reticulum of sand grains. Fibre structure is like that of *Aplysilla*, but in some species that become erect and branching, the supporting skeleton becomes branched.

Chelonaplysilla aurea sp. nov.
(Fig. 17A-C)

MATERIAL EXAMINED

HOLOTYPE: QMG304695, ORSTOM (R1349), Stn. 423, Iles Chesterfield, 20°58'10S, 158°34'60E, 42-44m depth, 23 Jul 1984. Coll. G. Bargibant.

DIAGNOSIS

Chelonaplysilla with a golden yellow colour in life, large pointed conules and large oscules which are flush to the surface and distributed over the whole body.

DESCRIPTION

A soft spreading sponge, 6cm by 8cm in area and 2cm thick. Oscules are large, 3-6mm in diameter, flush with the surface and distributed over the whole body. The texture is soft, collapsible, easily torn. The colour in life is golden yellow (Y-R-Y^7/10) and in spirit pale pink (rY-R^8/4).

Surface. The surface is covered with large pointed conules, 1-2mm high which are often supported by two primary fibres giving a tent-like appearance to each one. An organised and beautifully regular, sandy reticulum occurs over the entire surface. Meshes of the reticulum are oval, 100-150μm in maximum dimension.

Skeleton. The skeleton is dendritic, made up of sparsely distributed clear fibres with the pithed, laminate construction typical of the family. Fibres are uncored, 110-140μm in diameter near the surface, up to 200μm in diameter basally. All fibres incorporate some cellular elements.

Soft tissue organisation. The ectosomal region, apart from the superficial sandy crust, shows very little differentiation. It is lightly reinforced with collagen to a depth of 30-40μm. Prominent ectosomal lacunae occur beneath each osculum, but otherwise the ectosome is not strongly set off from the underlying choanosome. The choanosome is composed largely of oval eurypylous choanocyte chambers, 110-180μm in maximum dimension, and canals. Mesohyl volume is greatly reduced.

REMARKS

The pigmentation, oscular and conule structure differentiate the species from others described in *Chelonaplysilla.*

ETYMOLOGY

The species name refers to the brilliant colour.

DISTRIBUTION

Known only from the Chesterfield Islands.

Darwinella Muller, 1865

Darwinia Schultze, 1865

TYPE SPECIES

Darwinella mulleri Schultze, 1865, by monotypy.

DIAGNOSIS

Darwinellidae in which the slightly ramified, dendritic fibre skeleton is supplemented by diactinal, triactinal or quadriradiate spongin spicules. There is no sand in the fibres. The sponges are encrusting or massive to lobate.

FIG. 17. A-C, *Chelonaplysilla aurea* sp. nov. A, Holotype QMG 304695, preserved specimen (x 1.0). B, Photomicrograph showing the structured surface crust and a portion of the fibre skeleton (x 80). C, Holotype QMG304695, in situ, (x 2.5).

Darwinella sp. cf. **intermedia** Topsent
(Fig. 18A, B)

MATERIAL EXAMINED

QMG304696, ORSTOM (R348) Stn. 114, Banc Gail, 22°22'04S, 166°39'02E, 35 - 38m depth, 29 Jun 1976. Coll. P. Bourret. QMG 304697, ORSTOM (R1294), Stn. 305, Ile Paaba, 19°55'30S, 161°37'25E, 27m depth, 24 Jun 1981. Coll. P. Laboute.

REMARKS

There is great confusion in the literature with respect to the species of *Darwinella*. Excellent reviews by Topsent (1905) and Pronzato (1975) have been negated by later assertions that colour was widely variable within species (Pulitzer-Finali and Pronzato, 1980). This was seized upon by Wiedenmayer (1989) as an opportunity to refer clearly diverse sponges of a range of colours to two Southern Hemisphere species, *D. gardineri* with free oxeote spicules, and *D. australiensis* with triactinal to polyactinal spicules of a range of sizes. Bergquist et al (1990b), in a paper concentrating on diterpene chemistry, drew attention to the existence of several *Darwinella* species from Australia and New Zealand based upon terpene profiles, colour and spicule size and morphology. Poiner and Taylor (1990) gave a very sketchy description of one of these Australian species. The brilliant golden orange *Darwinella* referred to by Bergquist et al was recorded by those authors as *Aplysilla tango*. Although not mentioned in the description, this sponge has abundant, short, wavy oxeote fibrous spicules and is a *Darwinella*. Specimens of this sponge were among those lumped into *D. gardineri* by Wiedenmayer.

Also included in Wiedenmayer's melange were yellow specimens with long rayed triactinal spicules. These are possibly identical to the present specimens from New Caledonia; this remains to be confirmed. The closest species in the literature to these yellow *Darwinellas* with triradiate spicules is *D. intermedia* Topsent from Banyuls, but the two are almost certainly not identical. The New Caledonian specimens are undoubtedly new, but the material available at present is not adequate on which to base a new species description. Consequently the sponge is simply compared to *D. intermedia* which itself needs redescription.

Bergquist (1994 in press) has a full discussion of the Australasian species of *Darwinella* based on consideration of morphological, histological and chemical characters. There is no described species from that region into which the present specimens fit. Their colour is greenish yellow to yellow ($rY^8/10$) in life, dark purple black ($rRP^2/2$) in spirit, and the fibre spicules are moderately rare triradiates.

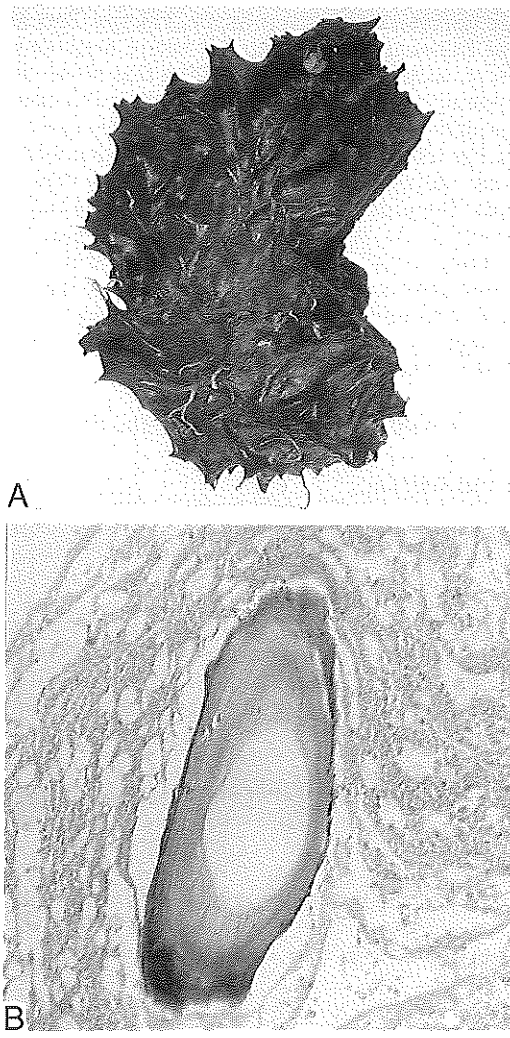


FIG. 18. A-B, *Darwinella* sp. cf *intermedia* Topsent. A, ORSTOM (R348), preserved specimen (x 0.75). B, Photomicrograph of fibre in cross section (x 75).

Dendrilla Lendenfeld, 1883

TYPE SPECIES

Dendrilla rosea Lendenfeld, 1883, by subsequent designation (Topsent, 1905).

DIAGNOSIS

Large, erect, branching or complex lamellate Darwinellidae in which the fibres branch repeatedly but do not anastomose. The fibres contain no coring material.

Dendrilla rosea Lendenfeld
(Fig. 19A, B)

Dendrilla rosea Lendenfeld, 1883: 271-294, pl. 10, figs. 3, 4; pl. 12, figs. 16, 19-23; pl. 13, figs. 24-27, 29-32; Lendenfeld, 1889: 716-719, pl. 44, figs. 4, 7, 8, 11; pl. 45, figs. 3, 4, 7, 8, 9; Bergquist, 1980: 486; Bergquist & Skinner, 1982: 49, pl. 1, fig. 3 (colour); Bergquist, in press.

Dendrilla cactos Selenka (sensu Wiedenmayer only), 1989: 152, fig. 98.

nec. *Spongelia cactos* Selenka, 1867: 566, pl. 35, fig 5.

MATERIAL EXAMINED

ORSTOM (R121b), Stn. 136, 22°00'07S, 165°56'04E, Ilot Canard, 20m depth, 1 Oct 1991. Coll. G. Bargibant.

REMARKS

Bergquist (in press) gives a full discussion of the confusion in nomenclature surrounding this species, and holds open the possibility that spiky, erect, terete forms from New Zealand and Australia, presently placed within *D. rosea* may require a new name. Further Australian collections are required to resolve this, since Wiedenmayer's analysis (1989) cannot be seriously regarded. Regardless of this possibility the fleshy, lobose rosered forms of *Dendrilla* will retain the name *Dendrilla rosea*. The only feature in which the single New Caledonian specimen differs from New Zealand and Australian specimens is that the laminations of the fibres are slightly twisted like a skein of wool, rather than being parallel to the long axis of the fibre.

DISTRIBUTION

New Zealand, Southern Australia, New Caledonia.

Family DICTYODENDRILLIDAE
Bergquist, 1980

DIAGNOSTIC REMARKS

Dendroceratida in which the skeleton is reticulate and the fibres are concentrically laminated and pithed. Pith may be substantially obscured by incorporation of detritus into fibres. Fibre skeleton can be augmented by the addition of free spongin spicules. The large, oval choanocyte chambers are eurypylous. The reticulate structure of the skeleton allows these sponges to attain large size despite the delicate, cavernous nature of the soft tissue. The fibre colour is frequently dark purple, red, or black, and contrasts with the soft tissue which is either pale or densely and uniformly pigmented.

Acanthodendrilla gen. nov.

TYPE SPECIES

Acanthodendrilla australis sp. nov.

DIAGNOSIS

Dictyodendrillidae in which the reticulate fibrous skeleton has irregular mesh arrangement with all elements cored with detritus. Reticulation is more pronounced superficially, and ascending, primary fibres project above the sponge surface. The strongly cored fibres and irregular reticulum distinguish the genus from *Dictyodendrilla* and the absence of free fibrous spicules distinguishes it from *Igernella.*

Acanthodendrilla australis sp. nov.
(Fig. 20A-C)

DIAGNOSIS

As for genus

MATERIAL EXAMINED

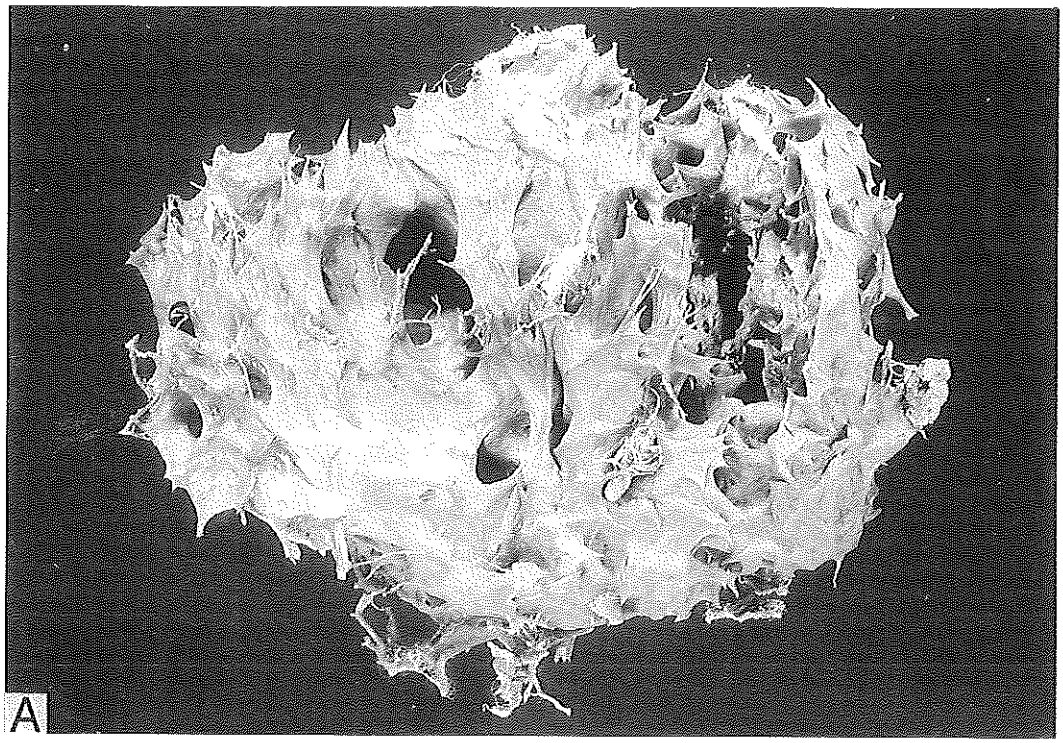
HOLOTYPE: QMG304698, ORSTOM (R121a), St. 136, Ilot Canard, 22°19'02S, 166°21'07E, 20m depth, 16 Apr 1981. Coll. P. Laboute.

DESCRIPTION

The body is in the shape of a thick fan rising from a broad attachment base. The sponge is 11.0cm high, 13cm wide, and 4.5cm thick. Oscules are irregularly disposed but confined to the broad upper surface of the body. They are large

overleaf

FIG. 19. A, B, *Dendrilla rosea* Lendenfeld. A, ORSTOM (R1216), preserved specimen (x 1.0). B, Photomicrograph of fibre showing lamination pattern (x 100).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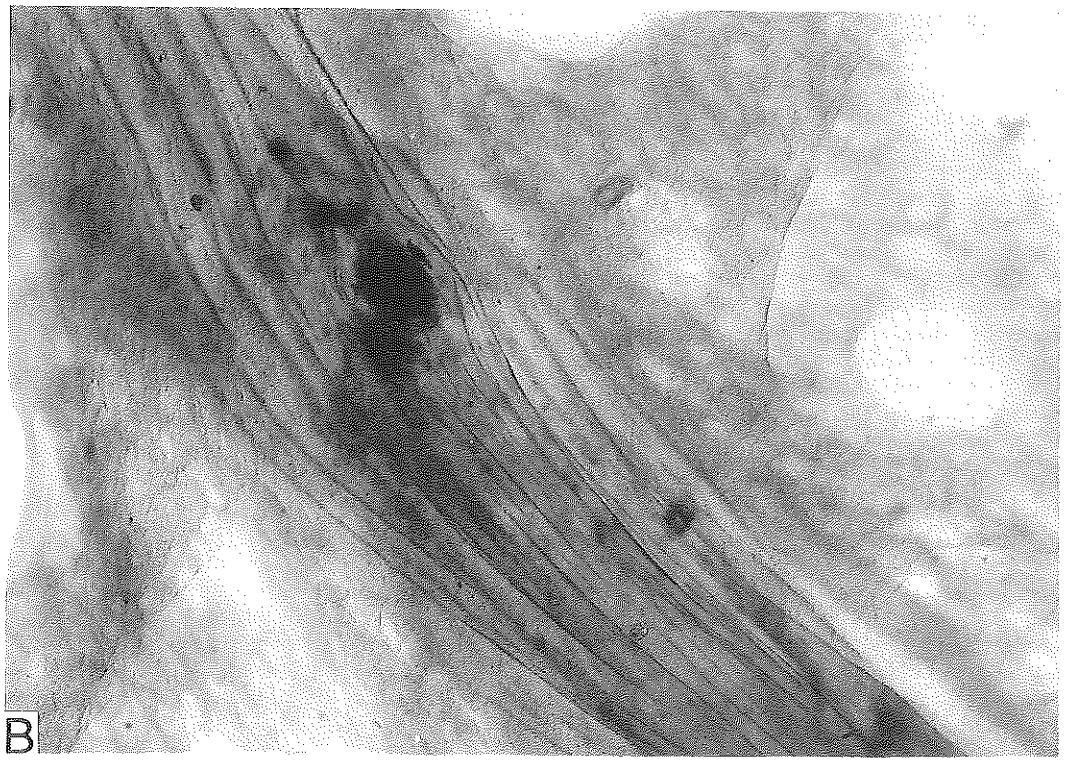
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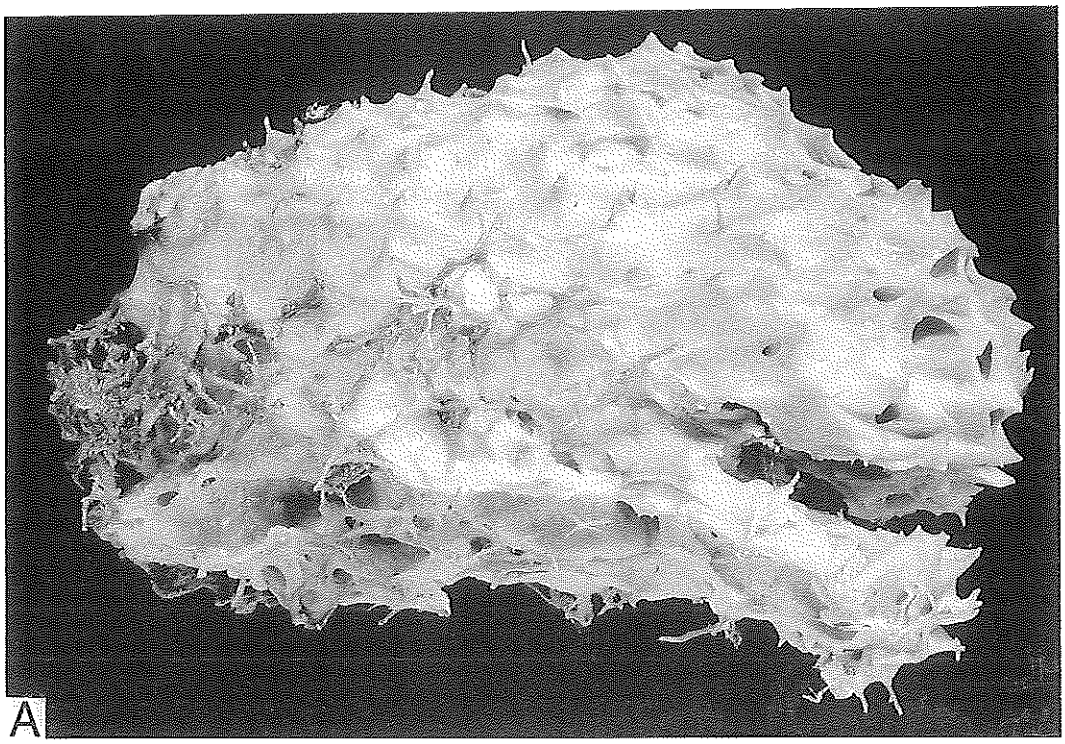
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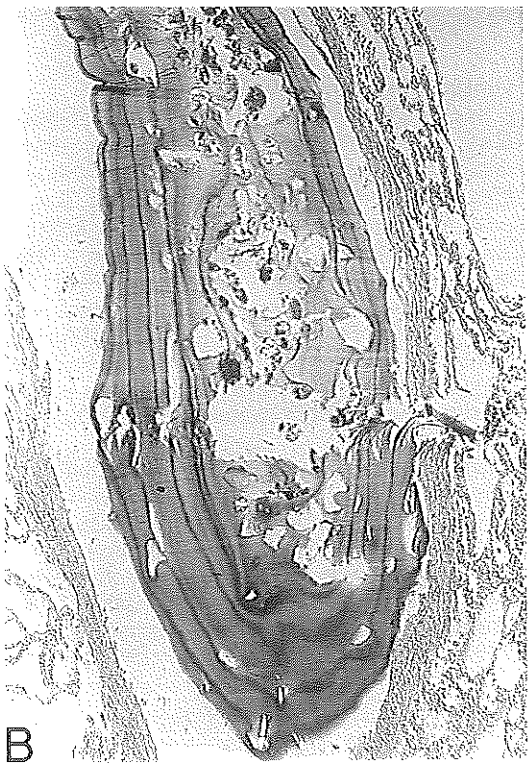
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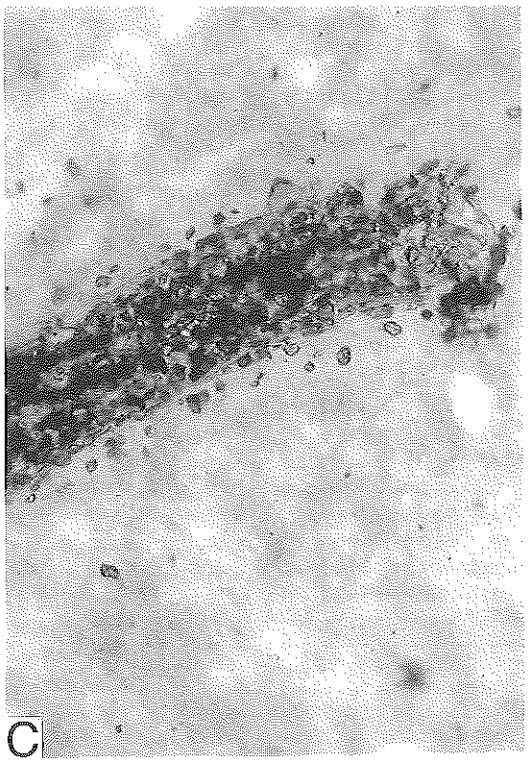

C

0.2 to 1cm in maximum dimension. Colour in life is unknown, in spirit biscuit (Y-R-$Y^7/4$). The texture is soft and compressible, but the fibres confer rigidity and coarseness to the overall texture.

Surface. The surface is covered in irregularly disposed, sharply pointed conules, 2.0-4.0mm high, from which primary fibres often protrude.

Skeleton. The skeleton is a reticulum with very irregular mesh and thick, coarse fibres, 250-2000μm thick. All fibres are strongly laminate and cored with sand and spicule debris. Despite the coring material, a central pith region is clearly evident.

Soft tissue organisation. A lacunar ectosomal region, 200 - 400μm deep underlies a thin collagen reinforced superficial region which is 30-50μm deep. The choanosome is cavernous with large volume devoted to canals. The mesohyl is reduced in extent and very lightly reinforced by collagen, and the choanocyte chambers are 60-120μm in longest dimension, oval and eurypylous. There is no interstitial detritus present.

REMARKS

The thick, coarse, cored fibres projecting above the surface and the irregular reticulum characterise this species.

ETYMOLOGY

The generic name emphasises the projecting fibres, and the species name an austral distribution.

DISTRIBUTION

Known only from New Caledonia.

Dictyodendrilla Bergquist, 1980

TYPE SPECIES

Dendrilla cavernosa Lendenfeld, 1886, by original designation Bergquist (1980).

DIAGNOSTIC REMARKS

Dictyodendrillidae in which the reticulate fibrous skeleton forms regular rectangular meshes and is composed of pithed, laminated fibres which are free of any coring material. The tissue construction is delicate and cavernous, and the soft tissue is frequently pale, contrasting with the dark fibres. The sponges are most often lobate, stalked, or spreading with digitate projections.

Dictyodendrilla elegans (Dendy)
(Fig. 21)

MATERIAL EXAMINED

QMG304699, AUZ 16, Stn. 268, Ilot Maitre, 22°20'02S, 166°22'50E, 19m depth, 13 Oct 1992. Coll. C. Battershill; BMNH 23.10.1.163 Terra Nova St. 134, Spirits Bay, 20-60m.

REMARKS

A full discussion of the nomenclature of New Zealand and Australian specimens of *Dictyodendrilla* is given by Bergquist 1994 (in press). Several species can be differentiated, most of which require full description or new names. Bergquist (1980) considered *D. elegans* to be a synonym of *D. cavernosa* (Lendenfeld). That decision is revised here and *D. elegans* is reserved for northern New Zealand specimens and the present specimen, which is the first record of the genus from New Caledonia.

DISTRIBUTION

Northern New Zealand, New Caledonia.

Order VERONGIDA Bergquist, 1978

DIAGNOSTIC REMARKS

Ceractinomorpha in which a fibre skeleton is always present, and this may be anastomosing or dendritic in construction. The latter condition is always associated with a reduction in fibre in relation to soft tissue volume. Dendritic skeletons have an overall divergent plan, as the term implies, but there is frequent fasciculation along individual branches caused by divergence and convergence of the complex, irregular fibre elements. Thus, 'dendritic' as applied to verongid skeletons refers to an overall divergent pattern but one which is not implemented rigidly as in the Dendroceratida.

In verongids with anastomosing skeleton the meshes are polygonal, and there is no distinction between primary ascending and secondary connecting elements. Fibres can become organised into a single plane either throughout the sponge or as lamellae near the surface; occasionally intertwined fascicles of fibres emphasise such sur-

previous page

FIG. 20. A-C, *Acanthodendrilla australis* sp. nov. A, Holotype QMG304698, preserved specimen (x 1.5). B, Photomicrograph of fibre in cross section (x 200). C, Photomicrograph of a portion of the fibre skeleton (x 100).

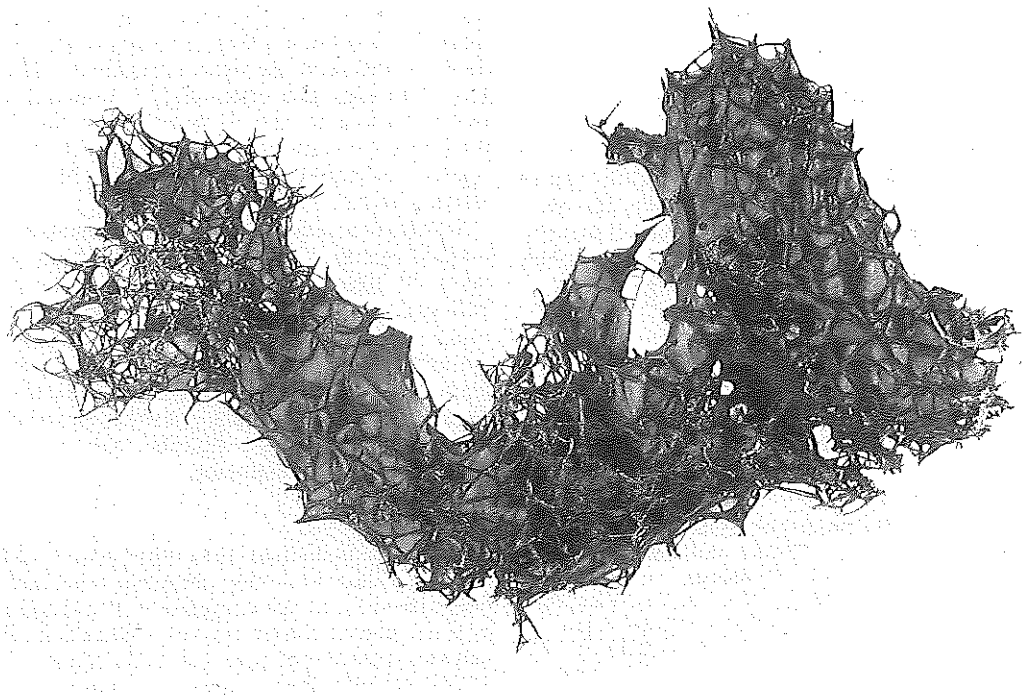


FIG. 21. *Dictyodendrilla elegans* (Dendy) QMG304699, preserved specimen (x 1.0).

face specialisation. The typical fibre structure is a markedly concentric laminar bark surrounding a pith of fine fibrillar material. Both bark and pith elements can be reduced and bark is lost entirely in one genus, but some elements are always present. Fibrous spicules separate from the main skeleton and composed only of bark elements occur in one genus. The boundary between bark and pith is very marked, and the fibres on drying appear hollow. Cellular elements (spongocytes) become incorporated in the fibres in one family. Fibres rarely contain foreign detritus. Choanocyte chambers are diplodal, sac-shaped or slightly tubular, and are set in a matrix in which many different cell types are represented and which is densely infiltrated by fibrillar collagen. A collagenous ectosome is usually differentiated. The texture of verongiid sponges reflects the collagenous nature of the matrix, they are homogeneous, deformable and fleshy. A very common pigmentation is sulphur yellow tinged with green; on death or damage this oxidises rapidly to dark brown, or more frequently deep purple, almost black. The mode of reproduction is oviparous; the structure of the larvae is unknown. Verongida are extremely distinct biochemically. They have no terpenes, but a lipid fraction high in sterol within which novel aplystane sterols frequently dominate. A series of tyrosine-derived brominated compounds occur in all genera that have been studied.

Family APLYSINELLIDAE Bergquist, 1980

Diagnostic Remarks

Verongida with a dendritic skeletal pattern in which the pith elements of the fibres are emphasised and the bark component can be reduced or absent. The fibre skeleton is sparse in relation to the matrix volume, and it may be augmented by spongin spicules formed of bark elements. The choanocyte chambers are diplodal, small, and spherical; the matrix is strongly collagenous. Pigmentation is frequently sulphur yellow, with the same oxidation characteristics as for the Aplysinidae. However, some species have superficial pink to purple colouration and a beige to pale yellow interior and this pigmentation is stable in alcohol.

Porphyria gen. nov.

TYPE SPECIES
Porphyria flintae sp. nov.

DIAGNOSIS
Aplysinellidae with the typical dendritic skeleton with fibres having short, often flexuous branches and reduced pith component. Fibres are abundant. The sponge is in the form of a goblet and is a rich purple colour externally.

ETYMOLOGY
For the rich purple colour.

Porphyria flintae sp. nov.
(Fig. 22A-D)

MATERIAL EXAMINED
HOLOTYPE: QMG304700 ORSTOM (R193), Stn. 188, Maré, Cap. Boyer, 21°37'08S, 168°06'08E, 30-35m depth, 24 Jun 1977. Coll. P. Laboute.
PARATYPES: ORSTOM (R.340), Stn. 114, Banc Gail (lagoon), 22°22'04S, 166°39'02E, 35-38m depth, 29 Jun 1976. Coll. P. Bourret. ORSTOM (R246), St. 172, Ile des Pins, 22°431'08S, 167°30'04E, 30m depth, 7 Jan 1977. Coll. A. Intés.

DIAGNOSIS
As for genus.

DESCRIPTION
A stalked goblet shaped sponge with distinct internal oscular and external poral faces. The holotype is 7cm high, 7cm across, the wall of the cup is 1.5cm thick at its mid-point, and the stalk is 1.5cm thick. A second specimen is 7cm high, 5.5cm across, 1cm wall thickness, with a stalk 0.5cm thick. Larger specimens up to 20cm high and 15cm wide have been recorded. Oscules are small 1.0mm in diameter, circular, each located in a slight depression on the inner face of the vase and surrounded by a membranous rim. The colour is pale to deep purple ($bP^6/8$ to $bP^5/8$) externally, and cream ($Y^8/4$) internally, in spirit purple black ($rR\text{-}P^2/2$). The texture is firm, rubbery but compressible.

Surface. The interior surface of the vase is smooth; the exterior is just roughened by fine low conules and can be smoothly contoured or thrown into mounds.

Skeleton. The skeleton is made up of slender dendritic fibres ramifying from a centre basal point which is either a narrow or broad stalk. For most of their length the main fibres are of even dimension, 60-80μm thick. They taper to sharp points near the surface, narrowing to 15-30μm diameter. The branch fibres arising from the main dendritic elements are short, typically 30-350μm long, flexuous and often sharply pointed. Pith makes up one quarter to one third of the fibre thickness, the surrounding bark is very dense and tightly laminated. This renders the fibres extremely brittle.

Soft tissue organisation. The ectosome is a well marked region, 110-140μm deep, with an outer layer 20-30μm in extent which contains little collagen and has a high number of spherulous and other secretory cells. The deeper region is strongly collagen reinforced, but also contains many spherulous cells superficially. The choanosome is very evenly collagen reinforced and choanocyte chambers are diplodal, spherical and small, 15-30μm in diameter.

REMARKS
Porphyria is distinct from other genera of the Aplysinellidae, in having abundant branched fibres with reduced pith component. The shape and brilliant purple colour are also distinctive. One sulphur-yellow specimen has been found (ORSTOM R1340). Such variation in pigmentation in all Verongida depends upon the oxidation state of the body pigments and is always observable upon death or damage.

ETYMOLOGY
For Professor Valerie Flint, medieval historian, who has provided help with many sponge names.

DISTRIBUTION
Known only from New Caledonia.

Pseudoceratina Carter, 1885

Psammaplysilla Keller, 1889; *Korotnewia* Polejaeff, 1889; *Druinella* Lendenfeld, 1889.

TYPE SPECIES
Pseudoceratina durissima Carter, 1885, by subsequent designation of de Laubenfels (1948).

DIAGNOSIS
Aplysinellidae with sparse fibre skeleton organised on the dendritic plan typical of the family. Pith elements only are present in the fibres. The matrix of the sponge is extremely dense and heavily reinforced by collagen; the texture is hence firm, and often extremely hard and incompressible. The surface of the sponge is conulose or tuberculate.

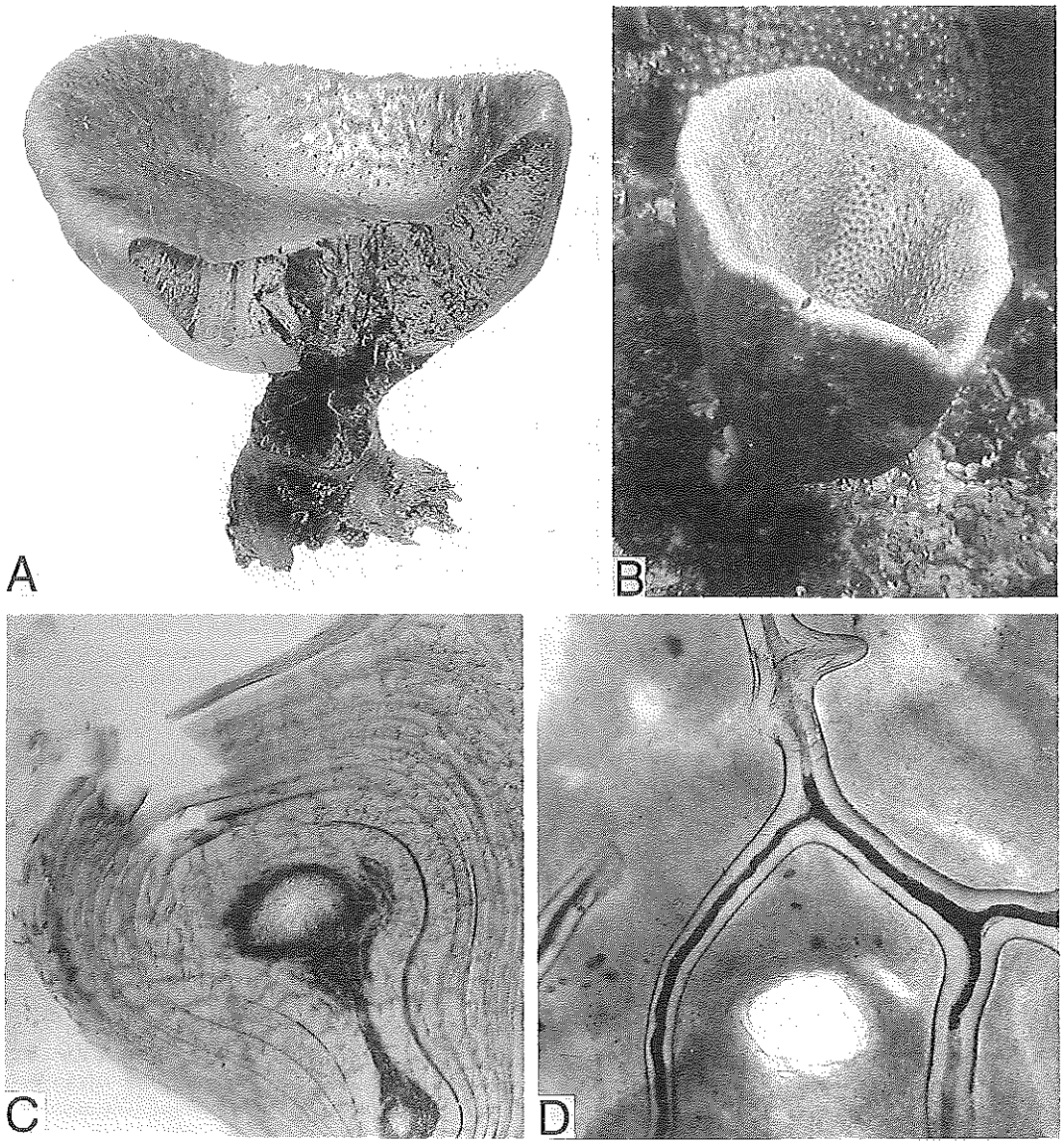


FIG. 22. A-D, *Porphyria flintae* sp. nov. A, Holotype QMG304700, preserved specimen (x 1.0). B, Holotype QMG304700, in situ. (x 0.75). C, Photomicrograph of fibre in cross section (x 300). D, Photomicrograph showing fibre structure (x 80).

REMARKS

Some discussion of the above synonomy is necessary and should be read in conjunction with remarks made later relating to *Suberea*. The type specimen of *Pseudoceratina durissima* Carter is BMNH 83.4.12.48 as indicated by Bergquist (1980). This sponge is in an excellent state of preservation and sections taken from this specimen have been re-examined in the course of this work. This specimen has very firm texture as a result of dense collagen aggregations throughout the body; it has sparse fibre content and the fibres lack a bark component; they also contain some sandy material. Slides registered as BMNH 86.12.15.86a are inscribed 'type' also. These are thick sections and have been examined, and in all

features they are identical to those of BMNH 83.4.12.48. An earlier diagnosis of *Pseudoceratina* (Bergquist 1980) was based upon observation of thick sections only and these gave an impression that there were traces of a refractile bark present in the fibres. This is not the case as new histological sections show. The sponge has only pith elements in which scattered, not organised, sandy detritus is incorporated. As a consequence of this, the suggested distinction in fibre structure which sustained recognition of *Psammaplysilla* Keller as distinct from *Pseudoceratina* Carter cannot be made, and the former becomes a junior synonym of the latter.

In the absence of a type specimen, Bergquist (1965, 1980) considered the genus *Druinella* Lendenfeld, based on the type description, to be unrecognisable except as a synonym of *Psammaplysilla.* Wiedenmayer (1989) reported that he had located a type specimen of *Druinella* in Berlin. Following study of this, he confirmed the identity of *Druinella* with *Psammaplysilla* and recognised *Druinella rotunda* Lendenfeld as a good species, distinct from *Psammaplysilla purpurea* (Carter), the type species of *Psammaplysilla.* In taking his analysis further, Wiedenmayer failed to consider the histology and fibre structure of the holotype of *Pseudoceratina durissima.* Consequently, both his elevation of *Druinella* as the senior synonym, and the elevation of the name Druinellidae to displace Aplysinellidae as the appropriate family name are invalid. Wiedenmayer's work (1989) displays little understanding of the structure and organisation of the 'keratose' sponges, and in many cases he has several different species represented under one name. His discussion of *Pseudoceratina* and *Druinella* provide two examples of such confusion. By his own admission he worked from poor, thick sections. This is simply not adequate for descriptions of Verongida or indeed other 'keratose' sponges. Wiedenmayer's attempt to infer dubious status for the holotype of *Pseudoceratina durissima* can be dismissed, as can the comment to that end by Pulitzer-Finali (1982). Neither author looked at the histology of the type, either specimen or slide; it is entirely consistent with Carter's description; both authors were emphasising as a point of distinction the fact that *Pseudoceratina* was diagnosed by Bergquist (1980) as having both bark and pith elements in the fibres, while Carter had noted only pith elements. The above discussion corrects this misinterpretation.

There are two further points to address. Throughout the tropical Pacific and extending southward to temperate Australian waters, massive Aplysinellidae with sparse dendritic fibres with both pith and bark elements present, and very dense, often highly regionalised collagen aggregations are common. These specimens have been referred to in the main as *Pseudoceratina,* they now require a new name and *Suberea* is proposed in this paper, and species which can be assigned to it with confidence are named. In South Eastern Australia and in New Caledonia specimens of *Pseudoceratina* and *Suberea* are found commonly in the same habitats. They are similar in pigmentation, in their range of growth forms and surface organisation. All turn dark purple and become extremely hard in spirit or in a dry state. It is understandable that confusion has arisen; the major distinctions are in fibre structure and soft tissue organisation, but these distinctions are clear.

Bergquist et al. (1991) reintroduced the Druinellidae as a family separate from the Aplysinellidae and recorded a specimen from New Zealand as being a second species of *Druinella.* The separation of the two families was based upon a very divergent sterol composition in the New Zealand specimen and its unique fibre structure. The fibres are dendritic and very thin, with both bark and pith elements present but the latter is extremely reduced. The fibres are extremely irregular, thrown into curves and with complex knotted outgrowths of the bark some of which appear to be free spongin rods or spheres. Only one specimen of this sponge has been found. It is very distinct from the Australian *Druinella* records now correctly referred to as *Pseudoceratina rotunda* and will require a new family to be established for its reception. That will be done in a forthcoming monograph on the New Zealand Sponge Fauna. In the meantime further specimens are being sought. The status of the genus *Aiolochroia* Wiedenmayer will be considered under the discussion of *Suberea.*

Pseudoceratina verrucosa sp. nov.
(Fig. 23A-C)

MATERIAL EXAMINED

HOLOTYPE: QMG 304701 ORSTOM (R191), Stn. 186, Ilot Vauvilliers, Lifou, 21°07'09S, 167°34'00E, 10-35m depth, 21 Jun 1977. Coll. P. Laboute.

PARATYPE: ORSTOM (R1327), Beautemps Beaupre, 40m depth, 23 Nov 1981. Coll. P. Laboute. (Berquist, personal collection, no co-ordinates or Station number). ORSTOM (R570), Stn. 113, Grand récif M'Bère,

22°21'01S, 166°14'00E, 25-35m depth, 21 Jun 1976. Coll. P. Laboute.

DIAGNOSIS

Pseudoceratina having a strongly verrucose surface, a sparse skeleton and thick coarse fibres.

DESCRIPTION

A massive, repent sponge with thick branches spreading over coral substrate; individuals can cover areas up to 30cm across. The holotype is 12cm long, 4cm wide and 3.5cm thick with irregular contours. Oscules are prominent, 2-3mm in diameter scattered over the upper surface, slightly elevated with a pronounced contractile rim. The colour throughout is dull yellow ($rY^7/6$) to brown yellow ($rY^6/8$) in life, in spirit purple black ($rP^2/2$). The texture is hard and incompressible.

Surface. The surface is characterised by abundant conules 1-2mm high, which are rounded rather than pointed apically. The general body surface is uneven with low ridges present in places.

Skeleton. The skeleton is dendritic, made up of irregular fibres which are composed only of pith elements and which always enclose a small amount of sandy debris. The surface of the fibres resembles a solidified lava flow. Large areas of the body are devoid of skeleton; this is particularly so in the deeper region of the choanosome. The irregularity of the fibres makes measurements rather meaningless, but the range is from 220-600µm in diameter.

Soft tissue organisation. This sponge has strong collagen tracts deployed regionally to structure both the ectosome and the choanosome. All canals are surrounded by dense collagen depositions. In addition, collagen tracts surround fibres and divide the choanosome into islands of tissue in which the choanocyte chambers, 15-20mm in diameter lie. The ectosome is strongly collagenous, 300-800µm deep, made up of alternating bands of extremely dense collagen separated by areas which have a lower collagen content and high concentrations of spherulous cells. There are large canal lacunae along the inner boundary of the ectosome and in the immediate subsurface region there is a regular array of small inhalant canals.

REMARKS

The features which distinguish *P. verrucosa* from *P. purpurea* (Carter), the other common tropical species of the genus, are the strongly verrucose surface of the former as opposed to the predominance of sharp conules in the latter. Also, *P. purpurea* has abundant relatively fine fibre elements distributed evenly throughout the sponge, while *P. verrucosa* has a sparse skeleton and thick coarse fibres. Sandy inclusions in the fibres are rare in *P. purpurea* but consistently present in *P. verrucosa.*

Other species which now can be assigned to *Pseudoceratina* are *P. arabica* (Keller), which could prove to be conspecific with *P. purpurea*, and *P. durissima* Carter which almost certainly should receive Lendenfeld's sponge described as *Druinella rotunda* as well as the specimen allocated to that species by Wiedenmayer (1989). It will be necessary to refer to Lendenfeld's type specimen before confirming that synonomy. Further species of *Pseudoceratina* remain to be described from Australia.

ETYMOLOGY

The species name refers to the rough verrucose surface.

DISTRIBUTION

Known only from New Caledonia.

Suberea gen. nov.

TYPE SPECIES

Suberea creba sp. nov.

DIAGNOSIS

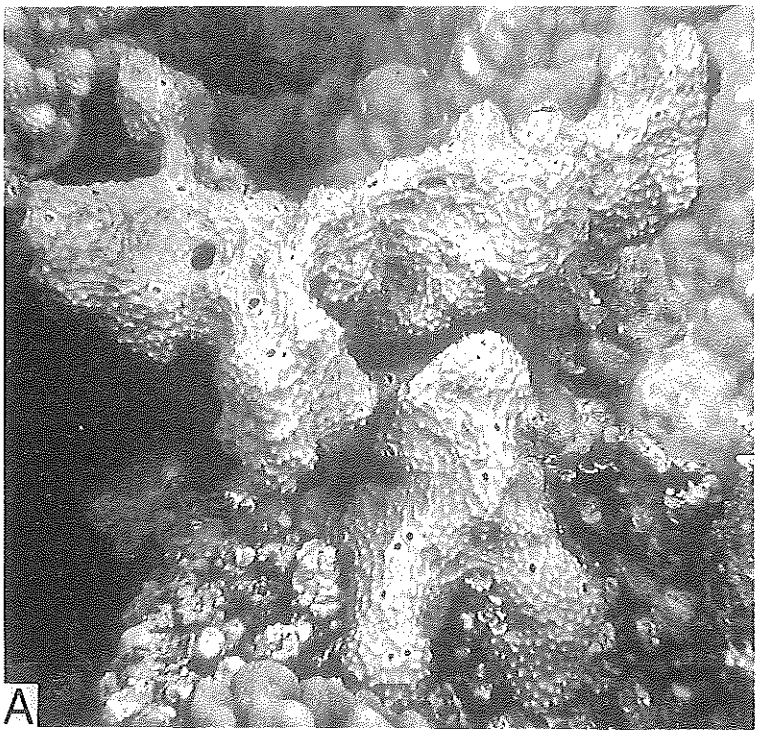
Aplysinellidae with coarse irregular dendritic fibres in which bark and pith elements are present but the pith predominates. The bark is strongly laminated and very brittle. Fibres can be very thick and render the texture of the sponge interior very rough. Dense collagen reinforces the matrix, rendering the sponges hard to just compressible. The surface is smooth or conulose and the sponge form massive, sometimes stalked or branching.

REMARKS

Species which fall into this genus are predominantly those which have been referred to

overleaf

FIG. 23. A-C, *Pseudoceratina verrucosa* sp. nov. A, Holotype QMG 304701, in situ (x 0.75). B,C, Photomicrographs of the fibre skeleton (x 100).



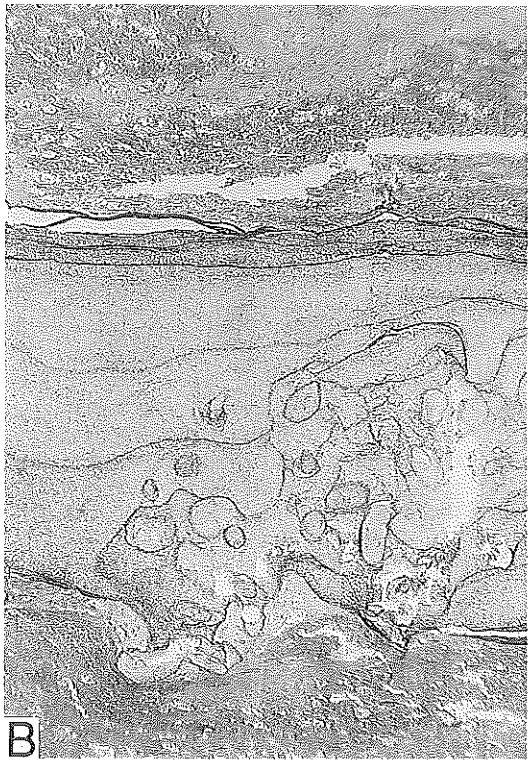
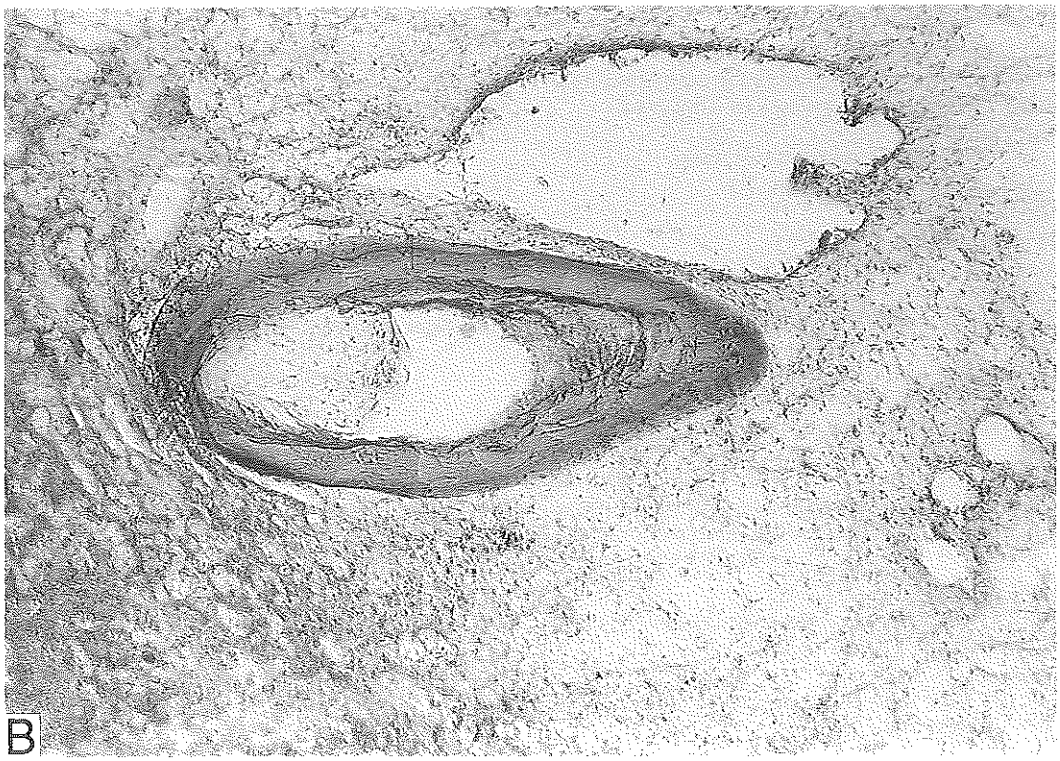


Fig. 23

A



B

Fig. 24

Pseudoceratina subsequent to Carter (1885) and following the diagnosis of that genus by Bergquist (1980) which stated that bark components were present in the fibres. As indicated earlier, confirmed by examination of the type specimen of *Pseudoceratina*, that genus lacks bark investing the fibres. A new name is consequently required for the present species group in which both bark and pith elements are present. There are a number of species from Tropical eastern and west Australia which need to be described under this name. *Pseudoceratina clavata* Pulitzer-Finali (1982) is the only described species which can be referred, although it is clear from his illustrations, that Wiedenmayer (1989: pl.37, figs 5,6) had lumped species with this fibre structure in with those referable to *Pseudoceratina* based on the characteristics of the type species.

The position of *Pseudoceratina crassa* (Hyatt) from the Caribbean needs clarification. It should be separate at the generic level from *Suberea*. It does not have the coarse fibre structure and the strong collagen reinforced matrix of that genus and the pitted contoured surface and pigmentation serve to further distinguish it. The name *Aiolochroia* Wiedenmayer, with synonym *Dendrospongia* Hyatt, should be reserved for this species.

ETYMOLOGY

The generic name refers to the corky texture of these sponges and translates as 'like cork'.

Suberea creba sp. nov.
(Fig. 24A, B)

MATERIAL EXAMINED

HOLOTYPE: QMG304702, ORSTOM (R1280), Stn. 151, Passe de St Vincent, 22°03'04S, 165°58'03E, 45m depth, 10 Sept 1976. Coll. P. Laboute.

DIAGNOSIS

Suberea with spreading habit, smooth surface and dense texture.

DESCRIPTION

A massive spreading sponge of irregular shape, covering an area 10cm by 15cm, to a thickness of 3-4cm. Oscules are 2-3mm in diameter, scattered, slightly elevated, and surrounded by a contractile collagenous rim. The colour in life is bright yellow ($Y^8/10$), in spirit purple black (rR-$P^2/2$), and the texture hard and cork like.

Surface. The general surface is smooth but the body is thrown into lumps and folds, giving a tuberculate impression.

Skeleton. The skeleton is dendritic, sparse and made up of fibres which are usually circular in cross section and composed of both bark and pith elements, the latter accounting for about three quarters of the diameter. The lamination of the bark fibre elements is not very evident but concentric fracture planes appear in sections. Typical fibre dimensions are 120-250µm in diameter.

Soft tissue organisation. A strongly collagenous ectosome 500-600µm deep is sharply separated from an underlying choanosome which is evenly collagen reinforced throughout. Spherulous cells are concentrated in the ectosome and along canals throughout the body. The external boundary of the ectosome is a fibre cuticle, 5-8µm deep; it is probable that this is transient but comparable structures have been reported in other Verongida (Bergquist, 1980). Choanocyte chambers are spherical, 15-20µm in diameter.

REMARKS

The spreading habit, smooth surface and fibre structure separate *S. creba* from the only other described species, *S. clavata* (Pulitzer-Finali 1982).

ETYMOLOGY

The species name refers to the dense texture of the sponge.

DISTRIBUTION

Known only from New Caledonia.

Suberea laboutei sp. nov.
(Fig. 25A-C)

MATERIAL EXAMINED

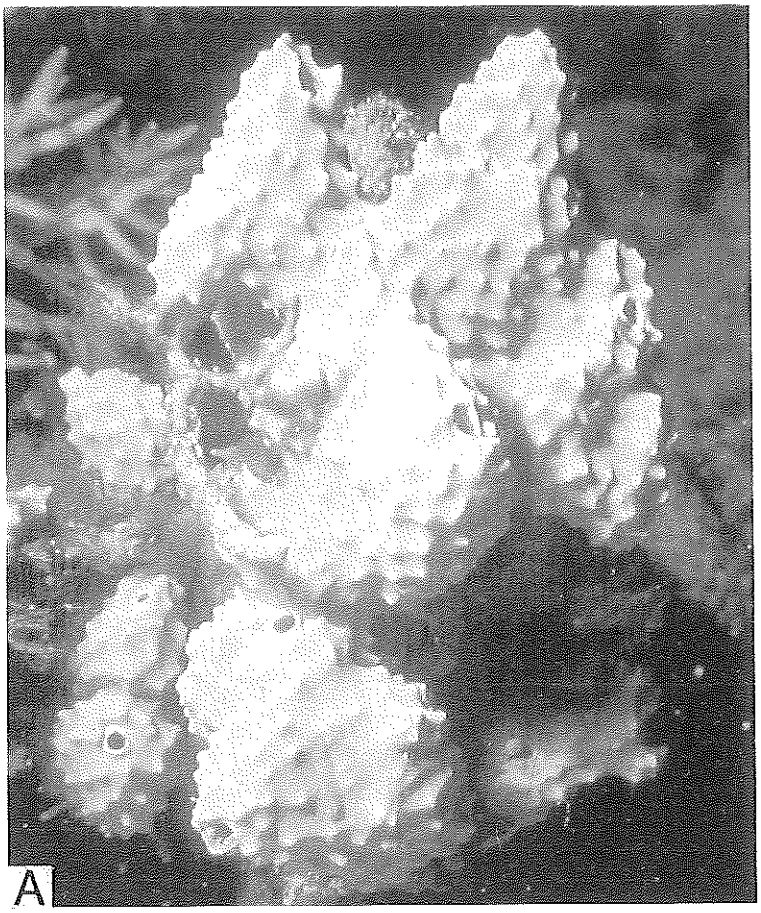
HOLOTYPE: QMG304703 ORSTOM (R1309), Stn. 320, Lagon nord, 19°02'50S, 163°33'30E, 18m depth, 21 Aug 1981. Coll. P. Laboute.

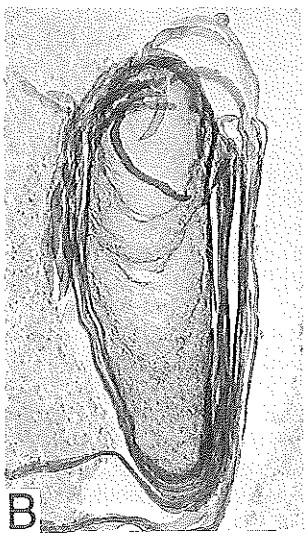
previous page

FIG. 24. A-B, *Suberea creba* sp. nov. A, Holotype QMG304702, preserved specimen (x 1.5). B, Photomicrograph of fibre in cross section (x 100).

facing page

FIG. 25. A-C, *Suberea laboutei* sp. nov. A, Holotype QMG 304703, in situ (x 1.0). B,C, Photomicrographs of fibre in cross section (x 100).


A


B


C

DIAGNOSIS

Suberea of multilobate form, having pronounced conulose surface and a strongly laminated brittle fibre structure.

DESCRIPTION

An erect, lobate sponge, 7cm high, 8cm wide, 4cm thick, loosely adherent to the coral substrate at multiple attachment points. Oscules are prominent, circular, 3-7mm in diameter, situated toward the apex of individual lobes and surrounded by a thickened membrane. The colour in life is dull yellow (Y-R-Y^7/10), in spirit chocolate brown (Y-R-Y^3/4). The texture is firm, but compressible.

Surface. The surface is covered in pointed conules, 1-3mm high which tend to be aligned into short rows, giving the surface a ridged appearance. The surface contour is very irregular, with many thin projections from the main lobes of the body.

Skeleton. The skeleton is dendritic and fibres are relatively abundant. They are spherical to oval in cross section. Sometimes two or three adjacent fibres are incorporated within common bark laminae. Both bark and pith elements are present. The bark has strongly defined, thin, concentric laminae which separate and fragment when sectioned. It never makes up more than one quarter of the fibre diameter and can be reduced to one tenth. Pith is the dominant element in all fibres. Fibres range from 200 to 700μm in maximum dimension.

Soft tissue organisation. There is a distinct ectosomal region 250-350μm deep, marked by islands of dense collagen deposition between which lie tracts of cells, most of which are spherulous cells. These make up an almost continuous surface layer. The choanosome is evenly collagen reinforced except around major canals, where collagen is heavily emphasised. Choanocyte chambers are spherical, 10-15μm in diameter.

REMARKS

The pronounced conulose surface, multiple lobate form, and the strongly laminated, brittle fibre structure distinguish *S. laboutei* from other species of the genus.

ETYMOLOGY

The sponge is named after M. Pierre Laboute, ORSTOM, who collected and photographed many of the specimens described in this work.

DISTRIBUTION

Known only from New Caledonia.

Family IANTHELLIDAE Hyatt, 1875

DIAGNOSIS

Verongida in which the fibre skeleton is anastomosing, frequently compressed into two dimensions, and radiating from a contracted base of attachment. Fibres contain cellular elements in distinctive concentric annuli; these occur mainly in bark elements, but are in pith as well. The fibres are of typical construction for the order. Individual fibres can attain great thickness, particularly towards the base of the sponge. The choanoctye chambers are large, and sac-shaped (*Ianthella*) to slightly elongate and occasionally branched (*Anomoianthella*). Where colour in life is known, it ranges from typical verongid sulphur yellow through deep orange to deep purple. All species show the characteristic oxidation reaction upon damage or death, and reach a final deep purple colouration. Biochemical characteristics are similar to those of the Aplysinidae and Aplysinellidae with respect to the occurrence of brominated metabolites. Thus far, no aplystane sterols are known from any species of Ianthellidae; these characterise the Aplysinidae and Aplysinellidae, which are almost identical in their major biochemical characteristics.

REMARKS

Previous diagnoses of the family Ianthellidae have included reference to *Bajalus* Lendenfeld, a problematic sponge which lacks a fibre skeleton, has sac shaped to slightly branched choanocyte chambers and a distinct collagenous ectosome. Bergquist (1980) referred *Bajalus* to the Ianthellidae, noting coincidence of choanocyte chamber structure and ectosomal development between *Anomoianthella* and *Bajalus.* More recently, species of *Halisarca* with highly organised ectosomal regions have been described (Vacelet and Donadey, 1987) and fresh material of Lendenfeld's sponge has been discovered from the Southern New South Wales coast where it is common growing on *Pyura.* Examination of this material confirms that it is a *Halisarca* properly referred to as *H. laxus.* Consequently, reference to Ianthellidae and Verongida as including forms which lack a fibrous skeleton has been deleted from the diagnoses.

Ianthella Gray, 1869

Basta Oken, 1815; *Haddonella* Sollas, 1903.

TYPE SPECIES
Ianthella flabelliformis Pallas, 1776, by subsequent designation of Topsent (1905).

DIAGNOSTIC REMARKS
Ianthellidae in which the fibrous skeleton is highly developed and makes up by far the great bulk of the sponge body. The skeleton is a reticulate structure typically developed in a single plane to produce a regular fan shape. Elaborations of the simple two-dimensional fibre arrangement which characterises *I. basta* are in the form of two-dimensional extensions almost at right angles to the basic reticulum as for example, in *I. flabelliformis*. Fibres are of typical construction, with both bark and pith elements represented. The bark contains many spongocytes arranged in concentric annuli.

Ianthella basta (Pallas)

Spongia basta, Pallas, 1766: 309.
Ianthella basta, Gray, 1869: 51; Bergquist, 1980: 498.

MATERIAL EXAMINED
ORSTOM (R401), Stn. 114, Banc Gail, 22°22'04S, 166°39'02E, 35-38m depth, 29 Jun 1976. Coll. P. Bourret. *Spongia striata* Lamarck DT523 No 48, Natural History Museum, Paris.

REMARKS
Ianthella basta is the best known and most easily recognised species of *Ianthella*. This is in part due to its wide distribution in the Indo-West Pacific, and thus its presence in older collections, but it is mainly due to the morphology of the sponge. The thin, two dimensional fan or vase-like form of *Ianthella basta* is very distinctive, and the fine reticulation of fibres in highly regular rectangular meshes, is very striking. *Ianthella basta* has been well illustrated and described by Lendenfeld (1889) and Topsent (1931, as *Spongia striata* Lamarck). In all specimens examined, there is no development of extensions of the basic two-dimensional fibre skeleton. *Ianthella basta* is also remarkable in that it exhibits the full known range of verongid colouration in a single species. There are no differences in fibre construction and arrangement or chemistry between specimens with differing colouration. De Laubenfels (1948) referred *Spongia striata* Lamarck to *Ianthella flabelliformis*; *Spongia striata* has been examined and it is definitely a specimen of *I. basta* Pallas, having the fine regular rectangular network characteristic of the species.

DISTRIBUTION
Northern Australia, Torres Straits, Papua New Guinea, Guam, Mascarene Islands, Indian Ocean, New Caledonia.

Anomoianthella Bergquist, 1980

TYPE SPECIES
Anomoianthella popeae by monotypy, Bergquist (1980).

DIAGNOSTIC REMARKS
Ianthellidae with thickened fan-shaped, club-shaped, or cup-shaped growth form, always having a discrete oscular and poral surface or a localised oscular region. The construction of the sponge is cavernous, with extremely thick fibres which form an irregular anastomosing reticulum; soft tissue is sparse in relation to fibrous material. The fibres are of typical construction, with substantial pith and a bark component in which numerous spongocytes are arranged in concentric annuli. There is no compression of the skeleton into a single plane as in *Ianthella*. The choanocyte chambers are eurypylous, but are elongate-oval and sometimes branched in a manner which recalls the chamber construction of *Halisarca*.

Anomoianthella rubra sp. nov.
(Fig. 26A-D)

MATERIAL EXAMINED
HOLOTYPE: QMG304704, Stn. 268, Ilot Maitre, 22°20'02S, 166°22'50E, 19m depth, 13 Oct 1992. Coll. J. Vacelet (no ORSTOM number).
PARATYPES: ORSTOM (R875), Stn. 183, Passe de Kouaré, 22°47'05S, 166°44'06E, 25m depth, 7 Jun 1977. Coll. P. Laboute. QMG304705, ORSTOM (R171), Stn. 136, Ilot Canard, 22°19'02S, 166°21'07E, 12-20m depth, 16 Apr 1981. Coll. P. Laboute.

DIAGNOSIS
Anomoianthella with less developed ectostome with patchy cuticle, fine fibres, large choancyte chambers and a brilliant orange-red colour in life.

DESCRIPTION
The holotype is a cavernous spreading fan, rising from a base 2cm in diameter to a height of 15cm and width of 13cm. The body is up to 3.0cm thick. Another specimen from the same collection

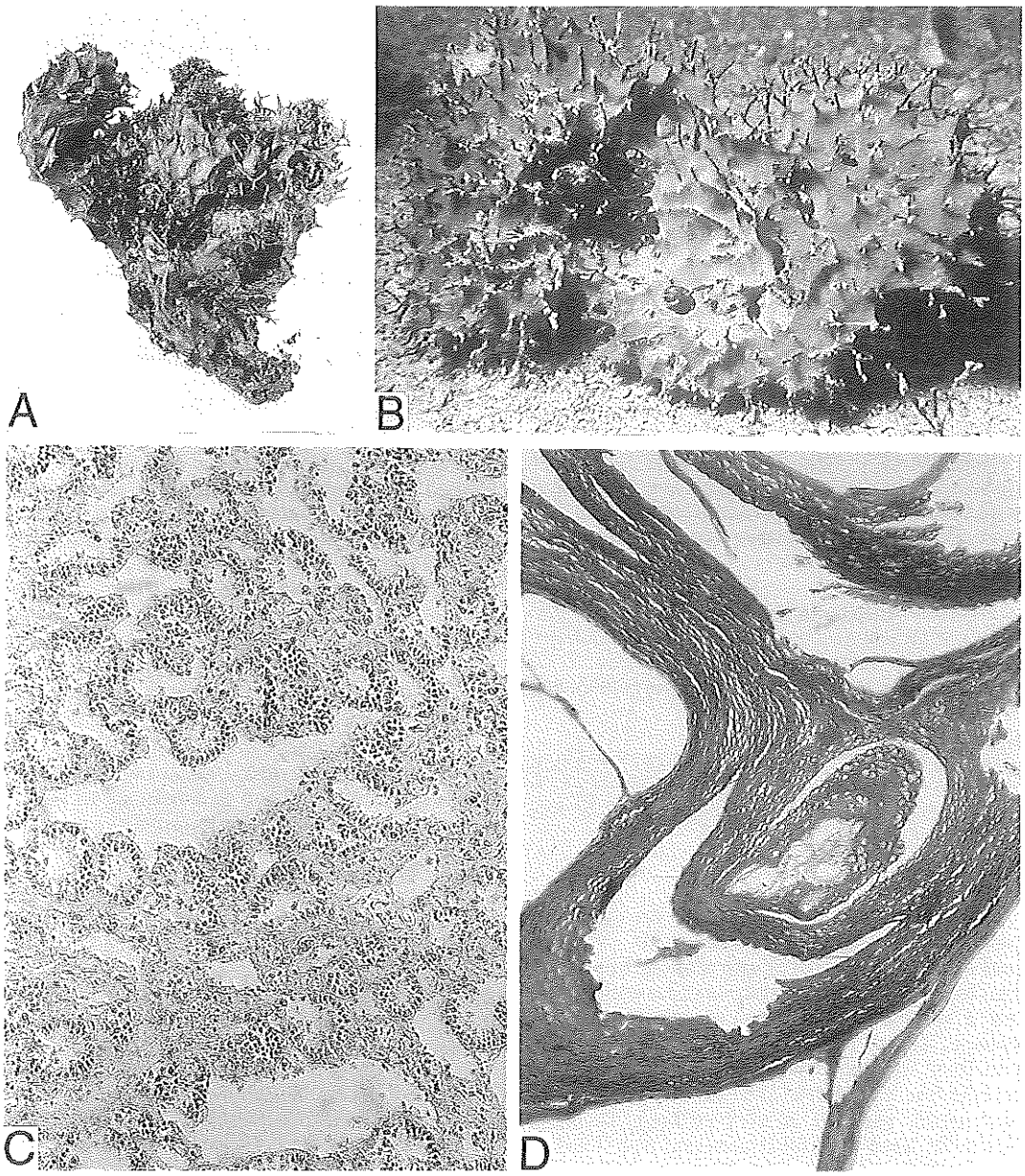


FIG. 26. A-D, *Anomoianthella rubra* sp. nov. A, Holotype QMG304704, preserved specimen (x 0.2). B, QMG304705(R171), in situ (x 0.5). C, Photomicrograph of choanosome (x 400). D, Photomicrograph of fibre in cross section (x 100).

is a more compact, low, fan 5cm high, 8cm wide, 4cm thick, with a broad attachment base. Oscules are large, irregular in shape, up to 1.2cm in maximum dimension, scattered over the whole body but they are most common along the apex of the fan. The flesh colour in life is brilliant orange-red (y-R^6/12), the contrasting fibres dark red (R^3/8); in spirit the sponge is uniformly purple black (rR-P^2/2). The texture is compressible, rendered rough by the dominance of fibres.

Surface. The surface is covered in coarse, sharply pointed conules up to 6mm high and

supported by single or branched fibres, many of which run a considerable distance in the plane of the surface.

Skeleton. The skeleton is made up of extremely thick fibres diverging from the base but anastomosing to form a very irregular, open reticulum. Individual fibres are slightly flattened, oval in cross-section, and up to 2500µm in maximum sectional dimension. Fibres contain both bark and pith elements, the latter making up approximately one third of the diameter in each. The bark is strongly laminated and charged with cellular elements, which are arrayed in annuli which fracture apart into strings of fibre and cells on sectioning. The bark grades into the pith, there is no clear boundary between the two regions, and cellular elements are present throughout the pith but are not in a concentric arrangement.

Soft tissue organisation. A narrow collagen reinforced ectosome is present, 120-200µm deep, marked by concentration of spherulous cells and set off from the cavernous choanosome by subdermal lacunae. In places a cuticle 20µm thick covers the surface. It is made up of fibre and encloses cells in exactly the same arrangement as in the fibres. The choanosome is lightly collagen reinforced, largely made up of canals and choanocyte chambers which are eurypylous, chiefly oval, but in some cases slightly branching, 70-110µm in longest dimension.

REMARKS

Anomoianthella rubra is distinct from the only other described species of the genus, *A. popeae* from Western Australia, in having a less developed ectosome with patchy cuticle, slightly finer fibres, larger choanocyte chambers, and in its colour.

ETYMOLOGY

The species name refers to the orange red colour.

DISTRIBUTION

Known only from New Caledonia.

CONCLUSION

Previous authors, based on largely on deep water collections, suggested that the levels of endemism in the New Caledonian sponge fauna are relatively high, at around 60% for the group as a whole (Lévi 1967, Lévi & Lévi 1983a,b). Lévi (1979) observed that the shallower water fauna contained far fewer endemic species, and had a significant widespread Indo-Pacific element. Two contributions in the present series of papers (Hooper & Lévi 1993a, 1993b), dealing with the orders Poecilosclerida and Axinellida respectively, come to rather different conclusions, recording 63% endemism for shallow water reef Poecilosclerida and 48% endemism for Axinellida, inclusive of the deep water component with no notable Indo-Pacific element being identified.

So many species remain undescribed throughout the southern oceans, that deriving percentage figures for endemism has little meaning. Also, the standard of the published literature is so heterogeneous that reference must always be made to deposited specimens; this is a slow process. Intensive studies of individual genera arguably can provide the best indicators, but there are very few available at present.

With the three sponge orders considered here, general problems already stated are compounded by the tendency of authors to lump many species, confusing later workers, and by the fact that many genera superficially appear very similar. To reveal the significant differences requires careful study.

Consequently, no conclusions are offered here on the affinities of the fauna, except to say that there is an Indo-Pacific element recognisable at specific and particularly generic level, and that North Eastern and West Australian affinities also emerge. New Zealand and Temperate Australian affinities depend upon one species only. The high number of endemic species is almost certainly a function of lack of collections and/or faulty identifications in adjacent regions.

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